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Greek Sculpture in Relief.

THE ELGIN FRIEZE IN THE BRITISH MUSEUM.*

IN one respect, at least, all the sculpture of the Parthenon, of which we have remains in the Elgin Room of the British Museum, partakes of the nature of *rilievo*, and when this is not the case as regards the treatment of the surface of the figures, it yet holds true in respect to their arrangement on the faces of the temple. Accordingly, the large statues from the tympana, as the Herakles and others of that series, although in themselves independent figures, yet in disposition in one plane in front of the wall close behind them, were in degree *rilievi*, although of the boldest kind of projection, and, as such, subserved the decoration of the architecture. They were not composed as statues to be seen alone and isolated, but as parts of an extended composition, and are treated accordingly. As an incident of this it may be found on measurement that the thighs of the Herakles are of unequal length, and that the left one is 2 in. shorter than the right; this having been done to obviate its otherwise too great projection over the entablature,—a modification legitimately in the nature of *rilievo*.

In the drawings which were made by a French artist for the Marquis de Noientel from the compositions of the tympana, as they then existed at a date considerably earlier than their removal by Lord Elgin, and when many more of these statues were in their places, the nature of the relief-like arrangement is fully manifested; and a similar observation may be made in respect to the plaster casts of the figures of the Eginetan tympana as at present seen in the adjoining room to the Elgin.

In further illustration of this *rilievo* arrangement of separate figures may be cited a speculation that the several statues of the Niobe family, most of which are at Florence, once filled the tympanum of an ancient temple of the divine twins, Apollo and Diana, who, according to classic legend, destroyed them with their arrows: the lovely and pathetic group of the mother, vainly attempting to shield her youngest daughter from their shafts, occupying the centre of the composition.

Although without direct authority, this idea points to the received mode in which the ancients were in the habit of composing separate statues in one plane in the tympana of their temples against the background, so as to assume the character of *rilievi*, although of the full projection of nature.

In this respect the statues thus situated in the Parthenon became of the quality of *rilievi*. Being placed also in the highest position, they were the largest in scale. Those which came the next in elevation and size were contained in the metopes; while of further reduced scale were those of the frieze, much lower down on the building.

Also, the figures at the greatest height from the ground were of the boldest projection, being statues actually in the round, although arranged in a plane; the next highest being in very high relief, yet attached here and there to the background; while those which occupied the lowest level were much the flattest, and in more than one respect is this gradation agreeable to the just instincts of art.

A low relief of a figure when it is of the size of life, on being placed near the eye, has something in degree unsatisfactory in its impression, and an inconsistency with the truth of nature asserts itself, which does not attach to a similarly low relief when on a smaller scale. We readily accept a form flattened in relief when it is thus reduced in scale; but if it reaches the size of actual life there is something in it not so pleasing; and thus it is an exception when we find such work executed with the intention of its being placed near the eye.

This may possibly be somewhat connected with the fact that the effect of lowness, or flatness, of relief, is to bestow superior size on the subject treated; as may be readily illustrated in the British Museum by comparing the low relief of the figures of the Parthenaic frieze with those of the reliefs of Phigaleia in the next room, which are especially bold in projection, insomuch that they approach the appearance of statuettes. Granted that there is a considerable difference between these in scale, the Parthenaic frieze being as three to two as compared with the Phigaleian; yet beyond this a diversity in apparent size, out of all proportion with that which actually exists, asserts itself in passing from the one to the other, the figures of the Parthenaic frieze being much the flatter of the two, and appearing very much the larger.

The reason for this plainly shows itself to be that lowness of relief gives distance to the subjects it treats, and, therefore, while subtending the same angle to the eye as similar subjects treated in high relief, they are apparently removed further, and thus become logically and effectively of a superior scale.

In the picturesque *rilievi* of the Italian and other schools, where very various distances for objects are adopted, the more remote figures are represented very small, according to the rules of perspective; but, being also treated very flatly, retain the same apparent scale as the larger ones in the foreground, which may serve to illustrate the large effect of the much-flattened figures of the Parthenaic frieze, and the grounds for the treatment it displays; for by this means the grand character of the sculpture enhancements of the architecture was preserved, even in those *rilievo* details which were near the eye, and, therefore, appropriately and agreeably much less than lifesize.

When this is considered in conjunction with the gradual increase of relief and scale of the sculpture as the eye ascends upwards to the metopes, and above to the tympana, we may recognise in these three levels of *rilievo* composition, in their combination with architecture, and their relative gradation, a congruity of purpose and balance of parts which evince the artlogic of the Parthenon. With these preliminary remarks in reference to the *rilievo*-like arrangement in connexion with the interior structure of this temple in which all its sculpture of which we possess remains was adjusted, we will employ the rest of our space in the consideration of the frieze.

In doing this we would first draw attention to the view that the quality of relief which characterises it differs from that of any other existing *rilievo*, and that in some respects its science is unique.

Relief in sculpture, while it is a special, is also a somewhat marvellous, art, inasmuch as it is the representation of true form by means of false form, as it is more or less flattened against a background, and yet is so arranged and treated as to appear natural.

A relief, however, demands to be contemplated, not like an independent statue, from any point, but as a picture, in front or nearly so. It does not endure to be investigated closely at the side, very obliquely to the plane of its face; nevertheless, it is eminently fitted for the embellishment of architecture and the enhancement of its structural surfaces.

The *rilievi* of different ages and schools display great differences of treatment, but may fairly be classed under two general heads. One of these comprehends those varieties which treat their subject sculpturesquely; and the other, those which handle it picturesquely. The former of these is the Greek mode.

For the sake of illustration, however, we may as well first turn to the opposite and picturesque treatment, as the contrast of its method elucidates the other.

No more representative example can be found of the picturesque method of *rilievo* than that which is afforded by the well-known beautiful bronze gates of the Baptistery at Florence, adorned with sacred subjects by Lorenzo Ghiberti. In these are represented many groups on different planes, and at widely varying distances. The figures of which they are composed are treated in accordance. Those which

* The term in general acceptance for these *rilievi* is here followed, although not strictly correct architecturally: a frieze, whether plain or decorated, signifying the central division of an entablature, between the architrave and the cornice; whereas these *rilievi* were on the body of the cella, behind the columns.

are afar off are very flat indeed, scarcely rising from the surface, and, in Italian art-phrase, are said to be *stacciate*, or crushed into the background. Then, as the groups and figures advance into the middle distance, and are larger according to the rules of perspective, their relief and rotundity also increase, until those portions of the composition which are most in the foreground, and consequently largest, are made so prominent as to project independently from the background, and are treated almost as separate figures or little statues in the round.

Excellent as these gates are in their own style, they offer an extreme example of the picturesque method of *rilievo*; while, on the other hand, the sculpturesque division can find no more emphatic representative than the frieze of the Parthenaic procession. They are, indeed, at the two poles of *rilievo* treatment, and illustrate each other by their mutual divergence. Their principle and science are utterly distinct and diametrically opposed. We have seen what the manner of the Ghiberti relief is, while, on the contrary, the method of the Phidian frieze is to bring out the whole of the subject-matter to a very equal degree of prominence from the background. Nevertheless, its method allows all the figures and groups to be quite distinct among themselves, and their outlines and details to be quite clearly marked, although with much delicacy. In this manner the whole subject is precisely and effectively defined at the same time that the utmost breadth of effect is maintained, and all must allow that the result is admirable.

The event treated by the frieze was the great Parthenaic festival which was held every four years, in the third year of each Olympiad, in honour of Minerva, and is presented in this work chiefly by the procession which formed an incident in it, and of which its subjects in detail are, as we know, various. That portion of it which is, perhaps, the most excellent, and certainly the most remarkable, and which illustrates most distinctly its controlling principle of relief, is the cavalcade of young Athenian knights, so often cited as illustrating the utmost grace of horsemanship as well as of sculpture.

This admirable composition, or series of compositions, which are so full of life and beauty, are yet directly pieces of ornament and decoration to the architecture, fulfilling their mission in this requirement perfectly, without detraction from the spirit and freedom of the living details. This equestrian procession of many men and many horses is so arranged and treated that it simulates, as it were, a horizontal ribbon of decoration, with a fringe above and below. The ribbon is formed by the bodies of the riders, while the heads and necks of both form the fringe above the main central band of the composition, and the legs of the horses the fringe below; and it is this, conjoined with the spirit of its subject, which renders it so very decorative and attractive a piece of work that modern architects have been glad to avail themselves of it, on more than one occasion, to enhance their structures.

Suppose, on the other hand, this subject treated in the Ghiberti instead of the Phidian manner. In that case, the back figures would have been pressed closely into the background, and scarcely more than outlined upon it, while the forward ones would have stood out, almost in the round, and have met the eye as spots of projection, with deep shades here and there. Unity and continuity would have been lost, and its special breadth of effect would have wholly departed.

This sparkling, picturesque treatment by Ghiberti was evidently suitable to its adjuncts of the Renaissance school, but it would have been far away from the simple dignity of the Phidian frieze, in which may be recognised as perfect a decorative effect, as an architectural piece of ornament, as if the subject-matter had been constituted but of foliage or conventional forms, instead of groups of men and horses in the most spirited, varied, and life-like actions. This may well afford a graceful example of the amiable sisterliness of the arts when brought together and combined by the inspiration of a great genius. In all respects, this cavalcade of Athenian knights, as represented on the walls of the Parthenon, may offer an instance of the happy union of sculpture and decoration in the service of architecture, which is not to be surpassed.

It has been suggested that the peculiar treatment of the relief of the frieze was due to its situation under the colonnade of the temple, where it received no direct light from above. This, however, is scarcely in accordance with its excellent effect in the very good top-light in the Elgin Room, which simulates that of the open air. Evidently in these situations on the body of the building, and behind the columns, these subjects were deprived of direct top-light from the sky; but as the careful conservance of the temple, without doubt, kept the white marble pavement beneath them and the steps beyond clean and bright, a strong reflected light was thrown up from below. This must have been in degree of the nature of that illumination which the forms and features of actors and actresses on the stage receive from beneath when they advance to the footlights. It is peculiar, and may be alleged to be unnatural, but it is not unpleasing, and, indeed, in some cases, may be acknowledged to be becoming.

Something of the effect of this kind of light from beneath, which produces shadows above instead of below, may be seen by the chance means of dust settling on the upper surfaces of *rilievi*, as it will do in a quiet room; and we recall an instance of seeing this illustrated on a set of casts of a portion of this very *rilievo*, in which the friendly dust, there being no top-light in the saloon round the walls of which they were fixed, had brought out the forms and compositions of the men and horses in a very effective manner by the simulation of such shadows above cast by means of light from beneath; and this afforded at least a suggestive hint of what might have been the appearance of the work in its original position. In the event of the electric light being more generally established in the British Museum, on some occasion it might be so arranged in the Elgin room as to afford this effect of light from beneath on the frieze, in a far more perfect manner, which would no doubt be a treat to the lovers of art, if considered to approach the effect of that which it received in its original position. Lighted, however, as they now are from above, no one can aver that their appearance is not highly satisfactory, which is another example of the truthfulness of the Phidian work, inasmuch as, although it was executed for a quite opposite light, it looks so well in the present one.

As regards the proportions of the figures of the frieze contemplated in relation to the Phidian theory of form which we have previously treated, they are evidently shorter and broader than in the larger statues. This, however, is logical, as a figure always appears somewhat slenderer in its relative proportions, according to the degree in which it is diminished in scale, as may be observed in the reductions of full-sized statues by the exact mechanical methods of the present day. Thus also, although the first little clay sketch by the sculptor may not look clumsy or too heavy, by itself in its small size, yet when it comes to be set up, magnified to its full proposed scale by precise measurement, he ever finds it overcharged, and has to pare down and refine its proportions so as to convey the same sentiment, grace, and impression as its first small sketch presented. Also the thickening and shortening of the forms and proportions of the figures add to the richness of the effect of the composition, a mode adopted by that master of the arts of design, the inspired Raffaelle, in the larger portion of those of his pictures in which the figures did not reach the size of life.

Anything approaching to a full description of the reliefs of the Parthenon would lead us to great length, but doubtless they will receive able illustration in the expositions on Greek art which Mr. Newton will afford to its lovers and students, elucidated by visits to the varied, and partly recondite, stores of the British Museum.

In repetition of a former suggestion, we would add that this would be an appropriate occasion on which to institute a more facile access to the metopes of the Elgin collection, which at present can only be reconnoitred by means of a field-glass, but which are of great interest in all their details to the artist, the archæologist, and the public. They and the frieze might well be compared together on the same level, by means either of casts of the metopes or some of the marbles themselves, so as to illustrate the different treatments suited to different degrees of relief, according to the tenets of the Phidian school more than 2,300 years ago, which probably would be acknowledged by some few to possess valuable truth, even in a country in which, in the present age, sculpture, or rather the intelligent patronage of it, appears to be at a low ebb.

QUESTIONS THAT CONCERN US AS WELL AS ITALY.

The third session of the Congress of Engineers and Architects, held recently in Italy, has adopted the rule, which we have before taken occasion to advocate with regard to our own scientific and technical gatherings, of following the course of more important associations for debate. Questions have been formally brought before the Congress; debates have taken place upon these; and a vote, sometimes unanimous, sometimes that of a considerable majority, has expressed the final conclusions of the Congress. When this plan is opposed to that of merely reading papers, listening to remarks on them, and perhaps hearing a few observations from the president (which often seem to carry no more weight than those of any other member), and then coming to no conclusion, it will, we think, be pretty evident from which method of procedure the best results may be anticipated.

The Congress in question was divided into sections. Of these, the first dealt with the subject of "Architecture and Civil Construction"; the second section was occupied with "Roads and Railways"; the third with "Hydraulic Works"; the fourth with "Industrial Mechanics and Technological Physics"; the fifth with "Legal Architecture"; and the sixth with "Survey, Topography, and Engineering applied to Agriculture." Our readers will naturally wish to hear something of the proceedings of the first and of the fifth sections.

In the first section, the first question put to the meeting was one which, in one form or another, is no doubt one of the chief theoretical problems of the architect of the present day. This is how it was formulated by our Italian brethren. "What are the fundamental conditions of an architectural style, which, availing itself of the progress of science and the introduction of new materials of construction, shall be adapted to the requirements, to the use, and to the present habits of the various provinces of Italy, and shall represent their natural and historic characters?" It is clear that here is an ample theme for all but interminable debate.

The resolutions at which the section arrived on this question were the following, which were drawn up by a commission chosen by the College of Engineers and Architects of Naples; a body of men, be it remarked, who have numbered amongst themselves not a few admirable architects.

In our society, says the first article, architectural style ought to be subordinate to the organic reasons of construction, and the *desiderata* for use; construction being never dominated by esthetic considerations.

The modern style, in the language of the second article, ought to be common to all the Italian provinces, with such modifications as are due to the difference of climate, of materials, of construction, and of habits and customs, and should be applied to all descriptions of edifices, with such modifications as are required by the differences of their character.

Thirdly, the modern style cannot be entirely new; but, in order to have a truly national type, should freely associate itself with the architecture of the past, avoiding purely conventional elements, and adopting the new materials and new methods furnished by science.

It is not our wish at the present moment to criticise or to debate the utterances of the architects of Italy; but, frankly, we cannot but hint that there may be some question how far the above-cited resolutions are of a nature to support the view which we above expressed of the advantage of terminating debates by a vote.

More sympathy will probably be felt by the architects of the United Kingdom with the next resolution of the section, and that all the more from its distinctly practical nature. The question put was, whether the provisions in force as to the professional rank (in the sense of academic degrees) of architects and engineers, and the division of the duties allotted to each, are adapted to ensure such an artistic course of education as shall guarantee the development and progress of architecture?

On the motion of Signors Castalazzi and Vivanet, an order of the day was voted, on this question, to the following effect. The first section of the third congress of engineers and architects approves the proposal brought before the Government for separating the education of

the architect from that of the engineer. It trusts that this will be carried out, as soon as possible, in the great Italian cities, in conformity to the recommendations of the preceding Congress of Florence, by the institution of a convenient course of study, so ordered, that while the architect shall be re-endowed with his true character of artist, he shall not lose the scientific culture which is demanded by the progress of construction, and by the very necessities of the art.

The character of the third question will be perceived by the reply given by the section: The first section of the third Congress of Engineers and Architects expresses its desire that restorations and new constructions shall not be entrusted by the Government to the ordinary care of the body of civil engineers, whose administrative duties do not allow the time for the long and difficult studies of art and of archæology.

It also desires that the King's Government should introduce a law to establish the rules to be adopted, both as regards the exterior and the interior of the buildings, in all cases of restoration or of conservation of public edifices.

The fourth question raised the large inquiry of the form, the materials, and the decoration proper for a hall for music *(sala armonica)* in general, and for the modern theatre in particular. As to this, the section voted, with an addition in the 7th clause, eleven articles, which were brought forward in an elaborate report by Signors Vivanet and Damiani to the following effect:—

1. That wood is the proper material to choose in order to augment the energy of sound in a room adapted for music; that it is best when of uniform fibre, and especially of fir.

2. That only one kind of wood should be used in the construction of any single room in which the distinct and uniform distribution of sound is desired.

3. That the flooring under any sonorous body should be hollow, placed over a compartment also made of fir, and isolated.

4. That it is most desirable that such a hall should be lined with wood, isolated as much as possible from the general fabric of the building.

5. That the soffit of a theatre, the archivolt of the stage, and the fronts of the boxes should have their superficies composed of thin planks, fitted together like boxes, and that if it is necessary to employ columns they should be of wood, and hollow within.

6. The form of a music-hall should be curvilnear; the elliptic curve is the best. For a theatre the horse-shoe form, now commonly adopted, should be maintained. It is best when the extremes of the semicircle are prolonged in parabolic lines, so as to present the form of a racket.

7. The stage should be constructed as a separate compartment (the term used throughout is *cassa armonica*—musical box); that it should make part of the scenic recess; and that this should be regarded, in great theatres, as the most important part of the building.

8. That the back of the stage-boxes should be curved and coved with low roofs. It would be better to eliminate these boxes altogether.

9. The soffit of the building should be concave, brought low at the sides, with an ample width around it.

10. The fronts of the boxes should be continuous and low.

11. And finally, in order to increase the musical effect of a theatre, the stage should be as large as possible (by the word *palco-scenico* is intended that separate part of the theatre, which is usually of a rectangular plan, which is occupied by the stage, independently of that part of the latter which may project into the auditorium). It will be seen that these recommendations deserve careful study, and that they show study on the part of the architects who brought them forward. The recommendation of the use of only one kind of wood, and that by preference fir; of the lining of the whole interior of rooms intended for music with wainscot; of the division of the wall-lining and of the floor from the masonry of the structure; of the disuse of metal columns; and of the care to be taken in the disposition and workmanship of the stalls, so as to prevent them from absorbing or echoing an undue portion of the sound produced, are all worthy of consideration.

On the sixth question, "Ought the Italian tradition to be observed in the actual teaching of architecture in Italy?" a long report by Signor Redone was read, and received with much applause by the Congress. This report did not enter into the question of the merits of the present course of study, but recommended the observance of certain principles, concluding with the following recommendations:—

1. That it should be a general canon that construction and decoration should depend on the use and destiny of a building.

2. That portion of the architecture of the past which should be studied by whosoever desires to execute work of a national character, and which should by preference be brought forward in all academic teaching, is that produced from the eleventh to the sixteenth century, corresponding to the different periods of Italian national life, and evincing the combination of originality with the Classic sentiment. From the earlier centuries such examples only should be taken as prove the continuity of this sentiment. Looking at the field of art broadly, every exigence of truth, of climate, of habit, and of locality, may thus be satisfied.

3. The traditional elements can refer only to mural structure; independently of which must proceed the adoption of new materials, the forms to be given to which must to some extent depend on the progress of science. Education ought to be in harmony with these principles.

On the conclusion of the debate on the above interesting report, the section agreed on the expression of a desire that some imperishable memorial, such as the naming after him of a Piazza, or important street in Naples, should be accorded to the architect Vauvitelli, whose bones have lately been removed to the monument erected for him at Caserta.

The fifth section occupied itself with questions of the proposed modification of certain parts of the law of Italy regarding buildings. The first point raised was in the case of part ownership of a house, where it was proposed to substitute a provision of the half of the value, for the half of the cost price, as the legal contribution from the proprietor of the upper part of a building to the cost of construction of the lower wall, on which his own rests. It was also proposed to make it imperative that such wall should be repaired at the common expense of the owners of the higher and of the lower story. Other points of this nature were discussed, but, as they refer by number and by section to the several articles of the laws which they wish to modify, they would be unintelligible without reproduction of the latter; and are not in themselves of any direct interest to the English architect or builder. It is, however, impossible to glance at the subjects discussed without becoming aware how many questions, both of a constructive and of a sanitary nature, with which in this country we are happily unfamiliar, must certainly spring from the Italian habit of building for ordinary use, immense mansions, the occupation and even the ownership of which are divided amongst numerous persons.

THE ROYAL ACADEMY EXHIBITION.

THE exhibition of 1880 cannot be said to be a strong one in so far as the presence of any great or remarkable works is concerned, but it may be said to be an unusually equable one in its interest. One or two eminent members are unrepresented, from various causes, and no one among the most distinguished of the usual exhibitors can be said to have done anything which would be regarded as adding a new honour to his name, or surpassing the average of his achievements. On the other hand, the less brilliant of our painters are on the whole at their best, and some have appeared in better form than usual; and the result is that there is a very equal distribution of works of interest over the walls, and each gallery has its fair average of merit. This being the character of the exhibition, we may note the more prominent works in the order of hanging, there being no special motive for departing from it.

Mr. Calderon's two figures, "The Olive" and "The Vine" (16, 25), are prominent in Gallery I., and suggest to us the idea that the second was painted in order to form a companion to the first, which is much the superior of the two. It represents a young Italian girl seated on a terra-cotta balustrade, and holding a basket of olives, a landscape of olive-culture forming the background. The figure (life-size) is a fine one in face and attitude, and is draped almost entirely in tones of green, to which the warm tones of the balustrade form a balance, not perhaps quite harmoniously. In the other work the attempt to produce a brilliant contrast has resulted in somewhat overheated and glaring colours, nor is the figure of so much interest. Between these hangs Mr. P. R. Morris's "Sons of the Brave" (20), showing the juvenile band of the orphan boys of soldiers at the Military Asylum, Chelsea, fronting the spectator, and apparently marching forward from the portico of the building; at least the persons in front who get out of the way so hurriedly evidently expect them to march out, and at the same time it is clear that they cannot march between the two columns without breaking their ranks, so that there is some confusion as to the movement of the composition. The figures are all carefully studied, and it is a sort of picture to be popular, but will not add anything to the painter's reputation. Mr. Peter Graham's "Highland Drove" (26) may be said to be a very good specimen of a kind of picture which he has done a little too often. Miss Hilda Montalba's "Venetian Boy unloading a Market Boat" (32) should be looked at; the artist has a style of her own, and promises more than she has yet done; the colour of the whole is fine, the drawing of the figure excellent, and the treatment of the accessories forming the miscellaneous boatload is marked by great breadth and force of handling. A large portrait group, "The House Builders" (40), by Mr. Frank Dicksee, is a somewhat remarkable effort not so much in portrait-painting as in the art of making an effective picture out of portraiture. It represents Sir W. E. and Lady Gregory discussing the model and the plans of a house which are on the table; the head and figure of the gentleman would pass as a very admirable portrait *per se*; that of the lady is not quite so successful, but the whole picture, which is on a large scale, is worked up into a very powerful effect by the richness of the accessories, the sumptuous table-cloth and inlaid ebony furniture being painted with great force and brilliancy, yet not eclipsing the figures, the whole being brought very successfully into harmony, the cabinet behind the figure of the gentleman being judiciously kept in shadow, so as to form a rich yet unobtrusive background to the colourless costume of the modern European gentleman, the light in the picture being concentrated on the lady's more brilliant costume and her immediate surroundings. This is not, of course, the highest or severest order of portrait-painting, but it makes a very effective specimen of what may be called decorative portraiture. Of Mr. Hook's two landscapes in this gallery, "Home with the Tide" (66) is one of his best efforts, full of air, light, and movement: to a certain extent, no doubt, his treatment of sea is mannered, but it is a manner so broad and powerful, and so fine within its own range, that one can hardly be critical about it, though we may object to the obvious attempts to imitate this manner by other painters (*vide* No. 17 on the opposite wall of the room). We passed over, by the way, Mr. Vicat Cole's best work (15), "A Thames Backwater," in which there is a broader style than we have generally seen in his landscapes; it will not be classed by general visitors as his most important work this year, but it has higher qualities than his other specimens. Then here is a landscape by Mr. Keeley Halswelle, whom we have known hitherto as a painter of rather clever but decidedly mannered pictures of Roman peasantry, and whom we would advise to stick to landscape in future, if this is a fair specimen of what he can do: it is certainly the best thing with Mr. Halswelle's name that we have ever seen; it represents an effect during "The Flood on the Thames, 1879" (74), near Pangbourne; it is a truly fine piece of landscape, and the cloud effect is grand. A very pleasing portrait of Mrs. Graham Hutchison, by Mr. Sant (82), and a rather commonplace young lady "Late for Church" (87), by Mr. Storey, also evidently a portrait, may be mentioned, as also a good study of the interior of St. Paul's, Antwerp (83), by Mr. Logsdail.

Gallery II. we fear may be distinguished as the room of failures,—comparatively speaking. Certainly Mr. Hodgson is not at his best in "Homeward Bound," which we should hardly have taken for his; nor Mr. Pettie in the portrait of "Mrs. Dominick Gregg and her Children" (122), in which the idea and attitudes of the group are very good, no doubt, but the faces, especially that of the lady, seem singularly deficient in modelling and expression. Mr. Harry Goodwin's "Autumn Chorale, Canterbury" (121), a view of the cathedral and its precinct in an autumn afternoon, does not reach the effect and feeling which the painter evi-

dently was aiming at. Mr. Leslie's "All that glitters is not Gold" (131) is not interesting as regards the figures, and utterly devoid of the feeling of light and air (it is a garden scene); Mr. Boughton's "Evangeline" (139) is an awkward perky-looking young woman with a bad walk; Mr. Storey's "Follow my Leader" is only a study of eccentric costumes; and Mr. Tadema is certainly not up to his usual quality, either in figures or background, in his "Spring Festival" (176); and in his smaller work, "Not at Home" (195), the interest is almost entirely in the furniture and the architectural ornament. On the other hand, Sir F. Leighton's "Sister's Kiss" (142) shows some of his finest work, in the foreshortening of the features of the young woman, and the admirable way in which the whole modelling and *tournure* of her figure is expressed in the sit of her drapery; it is a small painting, very delicately finished. Mr. Mark Fisher's landscape, "The Halt" (128), is a very good work, and is not characterised by that coldness of tone which has formed the one drawback to some of his works. Of Mr. M'Whirter's two paintings, the less striking, "June" (156), mainly a foreground picture, is the best. Among portraits, that of Mr. Charles Barry, by Mr. Lowes Dickinson, intended for the Institute of Architects, is a very good likeness, and Mr. Ouless's "Mr. A. Matheson" (117), an admirable specimen of unaffected and expressive portrait-painting.

Mr. Reid, who made such a striking success last year with his picture, which was purchased with the Chantrey fund, has aimed at a more pathetic subject this year in his "Mary, the Maid of the Inn" (199), in illustration of a ballad of Southey's, and there is a great deal of pathos in the wild figure of the crazed girl, but the effect of the whole is spoiled by the spotty and unnatural treatment of the landscape. Sir F. Leighton's "Iostephane" (204) is too artificial a figure to be very interesting. We may just mention Mr. Calderon's "Captives of his Bow and Spear" (211), and Mr. Long's "Assyrian Captive" (210), a powerful painting of an Assyrian girl with a harp beside her, and Mr. F. Goodall's "Moving to Fresh Pastures" (224), a good specimen of his Eastern scenes. Two very interesting works in this part of the room are the portraits of Mr. Millais and Mr. Watts, each painted by himself, by invitation, for the collection of portraits of artists painted by themselves in the Uffizii gallery. The two works are curiously representative of the artistic spirit and position of their painters; that of Mr. Watts in a red skull-cap, with a background, on which is seen a painted ideal head (which rather spoils and interferes with the portrait), seems almost intended to have the appearance of an Italian master of the old school, and is quite removed from the style and character of modern English portraiture; that of Mr. Millais, on the contrary, is a simple and unaffected painting of the head of an Englishman of the present day, a man of the world rather than an artist. In saying that it is "unaffected," we do not mean any reflection on Mr. Watts's portrait—it is probably natural to his feeling to paint himself as he has done; but we do rather feel that Mr. Millais's work is more to the purpose for the occasion for which the portraits are intended. M. Bastien Lepage has painted the Prince of Wales in a State costume (229), and with a very considerable licence in regard to likeness. We pass over divers things, some of them of interest, to come to Mr. Poynter's large work, "The Visit to Æsculapius," purchased under the terms of the Chantrey bequest. Finding no fault with the artistic judgment which dictated the purchase,* we may observe that we had been under the impression that the special object of the bequest was the encouragement of young or rising artists of promise, by the purchase of their works. We are possibly wrong. The small water-colour study of the picture we noticed with cordial admiration, some time ago, when it appeared in the Dudley Gallery, and the completed picture keeps the promise of the study. The scene is in the garden of the Temple of Æsculapius, who sits on the left between the columns of his portico, a stately old man with flowing beard, and examines with calm interest the foot held up to him by Venus, who has been pricked with a brier. The advice of a practical Æsculapius would probably have been that she should wear shoes in future; as she wears nothing at all her hurt is not to be wondered at. She is followed by the Graces, one of whom supports her as she shows her foot to the medical deity; the three are in nearly the grouping which has been so often adopted in representing the Graces, hands joined, and one with her back to the spectator. The figure of Venus is exquisitely pretty, the head especially, though there is nothing of the glamour of goddess-ship about her: she is simply a lovely young woman; of the other three figures, that with her back to the spectator is beautiful in line and posture, but we cannot but observe on the thickness and heaviness of the limbs below the knee in all the Graces, a peculiarity which we observed in other paintings of the female figure by contemporary English artists. We may be allowed to think that not a few of our fair countrywomen would justly consider the beauty of their sex considerably libelled by these lower limbs of the Graces, and could show a painter a very superior modelling, if the tyranny of social conventions did not stand in the way. The background of the picture is a mass of foliage, through which are discerned the white columns of a great Doric temple. The architecture of the Temple of Æsculapius we rather take exception to; the echinus of the capitals is not carefully drawn, and the columns are too narrow in diameter for very ancient work, which this should be, and the combination of a light wooden entablature with Doric columns of this type appears incongruous and at variance with architectural propriety; we might say historically untrue, but history can hardly perhaps be suitably named in connexion with a fabulous subject. Apart from this, it is a very fine and pleasantly-fanciful picture, which will always be a pleasure.

Another of the Chantrey purchases is "Returning to the Fold" (255), by Mr. H. W. B. Davis, a work which exhibits the best qualities of the artist as a painter of animals, and more sentiment in the landscape than he has always succeeded in imparting. A little further is another "bequest" purchase, which we also approve, Mr. Orchardson's "Napoleon on board the *Bellerophon*" (262). He stands apart looking in a brown study towards the coast of France; the figure is a very good specimen among the many representations of Napoleon on canvas. There would be more interest in the work if we could make out more distinctly the relation to the principal figure of the group in the rear, some of whom seem to be English officers, some Frenchmen; their connexion with the subject is rather vague. Mr. Long's "Mrs. Angerstein" (276) is a finely-finished portrait in a very dignified and stately manner; Mr. Watts's "Bishop of Exeter" (270), a portrait study of a very different stamp, admirable in its way. Portraits are strong in the large room: among others we may mention Mr. F. Holl's frank and humorous representation of "Major Graham" (302); and Mr. Ouless's "Mr. Justice Manisty" (309). Mr. Ouless is never better than in depicting the legal face, and it is somewhat interesting to study what are the facial characteristics which mark this type of intellectual development, a study which such a portrait almost suggests. But all the portraits are cut out by Mr. Millais's "John Bright" (322), which is a masterpiece, and one of the finest things he ever did. There is not the least attempt to "make a picture" out of it; it is simply realistic, but the face literally *thinks*,—there is the whole history of a career in its lines, and what minute study, too, in the painting of the details of the face! No one can equal Mr. Millais in making men of his time live on canvas, when he fairly rouses himself for an important subject. *O si sic omnia!* we may exclaim, when we compare this with the rough chalky portrait of a lady in Gallery IV. (430): it is difficult to believe they are by the same hand. There are two other important works to be named in Gallery III.; one is Mr. Faed's "From Hand to Mouth" (316), a large work, which is interesting as differing considerably from his usual line of subject. The picture is unequal: it represents a shop in the early part of this century, perhaps, where a tall dignified figure, who looks like a broken-down military man, is endeavouring to find enough money to purchase the barest necessaries of life from a shopman who shows him scant respect. The figure is a fine and pathetic one; the mistake of the picture is that the lady with a black servant, who is introduced as a contrast, would never have dealt at the same shop with the other people introduced; there is thus an air of improbability imparted to the scene, and the figure of the lady is certainly the weakest part of the work, and would have been better out for every reason. The other picture we allude to is Mr. Tadema's large work, "Fredegonda, Queen of the Franks," watching the Marriage of her Husband to a Princess of royal blood, to whom she, the first wedded wife, had to give way through not having that hereditary qualification. She, a woman of remarkable appearance, sits at a window in the foreground, watching the ritual going on out in the sunlight, quietly, but with a sinister gleam in her eye. There is nothing pathetic in the picture; much more might have been made out of the expression of the widowed wife, but Mr. Tadema is Mr. Tadema, and human expression and sentiment is not the special end of his art. There is brilliant painting of accessories, brilliant sunlight and air outside, and very interesting and peculiar architectural treatment of the window and its short columns, which are painted to perfection.

This brings us to the end of the large room; the rest of our notes we must defer.

* We understand that the picture was sold to an individual before it went to the Academy, and had to be bought back by the Council.

AT THE GROSVENOR GALLERY.

THE exhibition this season at the Grosvenor Gallery will probably be accepted as equal in interest to those which have preceded it. The collection as a whole retains the same general characteristics which have been conspicuous in the previous exhibitions, including some works of superlative excellence, a good many which illustrate special qualities of artistic power and peculiar lines of artistic thought and feeling, and a certain proportion which in the eyes of impartial critics will be generally regarded as odd and eccentric, and in some instances simply absurd. We may pardon this drawback, however, for the sake of the unquestionable advantage of having an important exhibition before the public, which goes out of the beaten track, which gives rise to questionings and considerations such as are useful even when they lead to the conclusion that mistakes have been made.

One feature in the Grosvenor exhibitions, which is a very valuable one, is that they are not entirely restricted to works which have not before been exhibited in London, and thus there is no official objection to bringing forth again for public enjoyment some of the best works of our leading artists which have for some time disappeared into the recesses of private collections. Thus the public have the great advantage of seeing again Mr. Watts's beautiful "Daphne," one of the finest works of its class, not only of our time, but we may perhaps say of any time in the history of painting. If such a work were to appear unexpectedly in a collection of "old masters" what a sensation it would make! The "Psyche" which hangs as a pendant to it has an exquisite feeling and sensitiveness; it seems a kind of embodiment, in painting, of the tremulous shrinking of the soul before the mystery of life—a supersensuous thought which almost goes beyond the limits of what painting can really and adequately express. Hence it is probable that the picture will have a very different aspect to spectators of different temperaments, and even to the same spectator in different frames of mind; looked at merely in the prosaic aspect of a nude figure it appears odd in colour, strangely "limp," and even weak: looked at from the poetic point of view, it has a peculiar interest and meaning; but we nevertheless hold that such a picture is hardly within the just limits of the painter's art; it is the effort to paint a thought, a purely spiritual conception of a nature, which can only be conveyed through the figure by sacrificing some of the glory and nobleness of the figure in its outer aspect; and though there is much that is physically beautiful in this figure, in spite of its unreal aspect and treatment, the principle is radically a defective one, and if carried a very little further would lead to very unsatisfactory results. These reflections are rather stimulated by comparison of the painting with its neighbour, the "Daphne," which is a greater and more complete work, because, though an essentially poetic conception, it is a poetry displayed through the highest form of outward beauty and completeness, through which it is the special province of the painter to speak to us.

The portrait of Mr. Holman Hunt, by Mr. Richmond, is a very remarkable work in portraiture, which may be called abstract portraiture, in which the object of the painter is to get rid of non-essential detail, and to concentrate everything on the expression and character

of the countenance. In flat opposition to this is the portrait, by Mr. Holman Hunt himself, of his son, a young man standing in open air in front of a landscape, holding a fishing-rod with one hand and his straw hat with the other. The picture conveys the impression that every square inch of it has been the object of separate and minute study,—every straw of the hat separately drawn, the float of the fishing-rod most "lovingly" painted (that is the word, we believe), and the face standing out from the canvas with the hard realism of a relief in ivory. What is the result of all this labour? To our thinking, a picture which, from an artistic point of view, is simply repelling, and which can only be regarded as a success if it be admitted that the object of the painter's art is to produce coloured photographs the size of life. Something might be said, too, about the unpleasingly manifest self-consciousness with which this highly-elaborated portrait of the artist's son is put before us in a specially-designed frame, with wreaths of fruit and flowers worked in relief, and coloured, as if it were to enshrine the likeness of Venus herself, instead of that of an ordinary youth, and his hat.

The large work by M. Bastien Lepage, "Les Foins," is one of a type with which the works of M. Legros have familiarised us, though the artist is perhaps more forcible and more thoroughly in earnest than Legros generally is in his larger paintings. It is a life-size picture of two labourers in a field, one of whom has thrown himself down on his back in sheer weariness, his hat shading his face; the other (a woman) sits up with equally wearied and worn face, her hands dropped on her knees with the helpless manner of hands accustomed only to rough labour, when not employed at their task. There is a strong and earnest pathos in the work, which is such a one as we might fancy the author of "Sartor Resartus" producing if he had been a painter instead of a writer; there is an evident moral intention in the picture, such as several eminent French painters have endeavoured to throw into their representations of peasant life, and there is also the same low and rather dingy tone of colour which seems to go with moral painting in France, though with us it is rather the other way. Among other portraits by M. Lepage is that exceedingly clever, and we fear we must add exceedingly odious one, of Mdlle. Bernhardt, which is familiar to us through an etching. M. Legros's two sketch portraits of Professor Huxley and Professor Marshall are exceedingly good likenesses, though in their present form very unpleasing in colour. His large painting "L'Incendie," at the opposite end of the Gallery, cannot be considered a success. Mr. Cecil Lawson's "August Moon," a large landscape, is perhaps the best work he has produced; his style is well adapted for effects of this kind; the companion work, "The Voice of the Cuckoo," a daylight landscape with two figures, is by no means equally successful; there is none of the colour and freshness of open-air landscape in it, and the figures, portraits of two girls, are certainly not fortunate. Some well-known names are represented in this part of the room by works which are about average examples of their talents, but present nothing for special remark; and Mr. Spencer Stanhope's painting of "Lethe" may be characterised as one of the most thoroughly ridiculous things ever hung on the walls of a picture-gallery, and which it seems difficult to reconcile with the idea of entire mental sanity on the part of the artist. Then we come on a group of portraits in pretty close proximity on the east wall. Mr. Watts's (No. 38) of a little girl, a half-length, is a very interesting portrait, both in regard to colour and character. Mr. W. B. Richmond has a large portrait of Mr. Darwin in a ceremonial red gown, which is, of course, valuable to the picture in one sense, but does not somehow seem to suit the character and aspect of the sitter, whose face has, in fact, an almost odd expression of dissatisfaction and discomfort, such as David experienced in putting on Saul's armour. Two portraits of ladies, by Mr. Millais, have some of his finest qualities, and are very effectively contrasted; that of Mrs. Jopling is a portrait brilliant and effective in both pose and the effect of the costume; that of Mrs. Caird, standing in a simple and unaffected attitude, with her hands joined before her, and in the plainest of dresses, is one of the most pleasing and thoroughly lady-like portraits that we have lately seen. Mr. Tadema sends three little works, of which "A Garden God," where a sacrifice is offered by a Roman damsel before a little figure in a niche in the wall, is in his best way. Mr. Richmond's portrait of the Dowager Lady Stanley of Alderley, and Mr. Lehmann's "Miss Davis," may also be reckoned among the thoroughly successful portraits of the exhibition. At the top of the room hangs a head by Sir F. Leighton, "Rubinella," of remarkable beauty in drawing and colour,—a rather thin refined head turned half way from the spectator; while one of the most finely-executed of the artist's heads, it is free from that over-finish of surface which has been not unjustly complained of as giving in some cases almost the appearance of wax to the flesh of his figures. Near this hangs a small and singularly-pleasing landscape by Mr. Alfred Parsons, "Last Gleanings,"—an evening scene painted with much feeling. M. Otto Weber's "Gamekeeper," with two dogs,—a French subject,—is an admirable piece of painting, especially the dogs. M. Tissot is not in the exhibition this year, and Mr. Macbeth seems aiming at something in his style instead, in the small work called "Waiting," which, if it has not quite the brilliancy and force of the French painter's work, has the merit of representing a much more agreeable type of young lady than he has generally painted.

We defer some notes on pictures in the other gallery of the exhibition.

VARNISHING DAY AT THE PARIS SALON.

To those familiar with the realities or the traditions of the Varnishing-day at Burlington House, with its few hundred artists, half of whom are old friends, and who mutually aid and criticise each other's works, "Vernissage" at the Paris *Salon* would appear a strange scene. From an early hour the rooms of the Palais de l'Industrie are occupied by the artists, but by one or two o'clock carriages commence to accumulate outside, a formidable *queue* is made by gaily-dressed personages, who by the afternoon comfortably crowd the thirty-three large rooms in which the 6,000 pictures and drawings are exhibited. Here and there a varnish-pot may be recognised, and the smell of mastic detected. Earlier in the day officials may be seen hanging the last pictures and attaching the last numbers. Varnishing-day so-called at the *Salon* answers in a measure to our "Private View," though amusingly less exclusive; indeed, since Longchamps has died a natural death, the "Vernissage" in the smart world is taken as a somewhat profane opening of the spring fashion campaign. Varnishing-day offers, therefore, to the observant visitor a very fair picture of the state of Parisian decorative art in its latest development.

This year the decorative art generally, like the tone of the exhibition, partakes of an exceedingly democratic character, the Directory hat appearing in every possible shape and colour on the heads of the lady visitors, and on the walls of the exhibition we counted no fewer than three pictures representing Charlotte Corday. Not only with regard to the subjects selected by many of the painters has the spirit of democracy been shown, but in admitting, as the jurors have done, so vast a collection of mediocre art, the very worst features of democracy are here displayed; however much the principles of advanced Liberalism may, in their occult manner, develop a high standard of artistic taste, it cannot be said that in Paris there is the slightest sign that their democracy is leading them in artistic matters towards the art that it is desirable should be encouraged. It appears, indeed, that many artists in Paris shrink from the contact with such wild efforts on the part of the younger painters to secure for themselves a share of public recognition. So evident is this desire among a large number of the painters this year, that it is sincerely to be hoped that the tradition is true which states that at the *Salon* you see less of the painter's real character than anywhere else.

In the greater number of cases the means adopted to attract attention are of the most commonplace French type; glare, blood, size, nudity, exaggeration, imitation of former successes, every species of trickery in the way of strange contrasts of colour, and repetition of old and faded motives that only for the moment or the day obtained a miserable popularity. It is positively astounding to think how few painters exhibit their works at the *Salon* this year who seem to have retained any affection for the old beloved traditions of their art,—men who, like Henner, still adhere to the refined treatment of the old days. It is therefore especially agreeable to find what is called a fashionable portrait-painter, like Baudry, endeavouring, with no small success, to emulate the noble example of Titian.

Of a different style, but equally remarkable, is the portrait by Bonnat of President Grévy, a portrait which promises to be the culminating point of Bonnat's ability, bidding fair to form the most famous of his great trio, Thiers, Victor Hugo, and now Grévy.

It is not a little disappointing in looking among the pictures by foreign artists, to find England so meagrely represented; it is certainly to be regretted that Mr. Watts has exhibited his "Orpheus and Eurydice." French artists here find an unfavourable resemblance in the figure of the Eurydice with that of a famous picture by Prud'hon, the "Phrosine and Melidore," and unfortunately, the original figure of Phrosine is so exceedingly lovely, and the whole picture by Prud'hon so satisfactory, that Mr. Watts's conception fails altogether to gain in this year's *Salon* the notice of any but detractors. England otherwise, with the exception of a small portrait by M. Dupuis, of the P.R.A., Sir Frederick Leighton, may be said to be altogether unrepresented by any familiar names. We see, almost with regret, the pictures of Alma-Tadema, whose efforts this year strike all critics who remember the splendour of his works in the Paris Exhibition of 1867, and who can recall the noble pictures he has since exhibited in London and elsewhere, as mere feeble shadows of those days.

The American painters who for the last two or three years have been making themselves honourably conspicuous at the *Salon* are this year almost as equally conspicuous by their assimilation with mediocre French art. In other respects the foreign exhibits are remarkably strong.

However unfair it may be, under any circumstances, to allow one's self to form unfavourable first impressions, particularly in an exhibition consisting of more than six thousand pictures and drawings,—objects of art, perhaps, they should be more properly called,—it is impossible not to feel that the Paris *Salon* of this year is likely to be, if not exactly the culminating point of the darkest hour of French art, long remembered as the exhibition containing the largest amount of bad art that has ever been brought together. If, as is almost certain to be the case, it succeeds in amusing the vast crowds who will visit it, it will merely show what we have all along known, that the mass are not the best judges of what is good for them. That the exhibition is likely to be amusing there is sufficient evidence, even on a hasty inspection, and we have every hope and belief that in going over the various exhibits we shall find, as in former years, many praiseworthy efforts of industry and intelligence. In fact, out of the enormous number of pictures that now at this moment crowd upon our memory, we can recall more than one not badly-treated episode of history, classic and modern, and here and there a romantic and well-treated landscape, showing something more than a desire to transcribe nature photographically, and displaying a proper veneration for the work not only of their own painters, but even the methods and manner of some of our great English masters.

We miss with regret numerous familiar names,—Meissonier, Gérôme, Lehmann, Rosa Bonheur of course, Dubufe, De Neuville, Detaille, Stevens, Vibert, and many others who long since gained their medals in the *Salon*. How the jurors are to determine on which picture to affix the "Prix du Salon" it is difficult to say; but if we can venture on a prophecy at this early date, we should think that the extraordinary but defective picture by M. Motte will share a great chance with Bastien Lepage's "Joan of Arc," a picture with which the world will very soon become familiar, but which unfortunately is less free from faults than former works by this young painter, whose name, however, will stand higher than ever in the estimation of the world. Bastien Lepage deserves high praise as having shown the utmost degree of devotion to a noble aim in the picture he has exhibited.

Cabanel exhibits an academic "Phèdre," a large picture, which, while showing all the qualities of the master, whose numerous pupils serve to fill so largely the *Salon*, will scarcely tend to increase the intellectual reputation of the painter. In a portrait of a lady, his old self is recognisable. To Bonnat's portrait of

President Grévy we have referred as satisfactory; the same cannot be said of his "Job,"—an unmeaning and photographic transcript, a geological survey, of an aged nude model. Jules Breton exhibits one of those scenes with which all who know him are so familiar, but which however, never tire,—peasants returning home after their day's labour. Benjamin Constant is excellently represented in a glowing Eastern subject of interest,—the termination of an historical rebellion. Bouguereau can be scarcely said to have increased his reputation by his unintellectual conception of a grand subject which has inspired more than one great master,—the "Flagellation of Christ." His other work, "A young Girl playing with Love," will doubtless please his admirers. In a very different school, M. Carolus Duran exhibits two portraits, in which he shows conspicuously what his friends are pleased to term his "*maestria*," but which might be qualified properly by a somewhat severer expression. M. Jules Goupil's "Madame Roland" cannot fail to charm a large number of the public, but as a conception of the devoted, loving wife of Roland, the story of whose death is one of the touching romances of the Revolution, the picture utterly fails. Madame Roland, moreover, was about forty at the time of her execution. As for the costume, M. Goupil seems rather to have had in his mind the caricaturists of the period, Vernet and his contemporaries (shall we add Watteau *fils* ?), than the graceful and far more truthful works of Debucourt, Tannay, Morean, or Gabriel de St. Aubin.

Pasini has an amazingly beautiful scene at the door of a Byzantine mosque, glowing in colour, and perfect in architectural detail, and which the restorers of St. Mark's would do well to study before setting to work on their somewhat thankless task. Gervex, whose youthful reputation stands deservedly high, has added, this year, another glory to his name by his careful night-scene. Gustave Doré is scarcely recognisable in two romantic landscapes. Laurens, whose "Death of Marceau" justly gained the prize some while since, has this year a strange but interesting representation of the "Lower Empire" in the portrait,—it must be so called,—of the last emperor, Honorius, a youth tricked out in all the imperial insignia of a period of gorgeous decadence. M. Hébert, like more than one other well-known painter, is only represented this year by a portrait, in a style in which few French artists ever do justice either to themselves or their sitters. M. Purvis de Chavannes exhibits an immense unfinished allegorical cartoon, entitled "Pro Patriâ." Desgoffes, as might be expected, has two marvellous representations of cups and crystal.

There are, of course, in this hasty enumeration, many names omitted, and numerous excellent works unmentioned. But on a cursory inspection it is only old friends that at first attract attention. There will be always time to return to the works, numerous this year, of less familiar men, whose praiseworthy efforts deserve the recognition it is to be hoped they will receive. More than one name, almost unknown till this year, will take a high place in public esteem in future exhibitions.

Before closing, a few words may be devoted to the innovations in the arrangement of the *Salon*. M. Turquet's much wit-bespattered idea of "Sympathetic Groups" has been abandoned, but the whole exhibition is roughly, and, as far as is possible, classed into four groups,—the "Hors Concours," those unable to compete for the prizes as already being medalled; those "exempt from the examination of the jury" who have gained some recompense; the "non-exempt"; and the "foreigners." Complaints have already arisen as to this arrangement, which it must be admitted has led to no very important change for the better on the old alphabetical *pêle-mêle* system. The drawings and water-colours are given larger space, and the architects are generously accorded for the first time two large rooms. As a last detail, several innovations have been introduced into the catalogue (almost rendered useless, however, since every picture is now distinctly labelled): there is a bound catalogue, and, marvel of marvels, but very useful for the large number of American purchasers, a catalogue in English, for which, however, we can scarcely predict a very large sale.

Ashbourn.—The memorial-stones of a new Wesleyan Chapel, now in course of erection in Church-street, were laid on the 21st ult.

THE TAY BRIDGE INQUIRY.*

THE Commission of Inquiry into the fall of the Tay Bridge has continued, during the past week, to receive evidence, of which the most valuable has, perhaps, been that offered by the Astronomer-Royal, and by Professor Stokes, of Cambridge. On the 26th of April, Mr. Law was cross-examined by Mr. Bidder, Q.C., who represents the engineer of the bridge. He stated that he had arrived at the conclusion that the strength which the bridge was designed to have was such as to require a wind pressure of 70 lb. to the square foot to overturn it. He also said that he considered that a pressure of 36·81 lb. on the bridge and train must have actually been exerted in order to overthrow the structure. The cross-examination was directed to eliciting support for the theory that the train, or a portion of it, had left the rails, and that by striking against the bridge it had been the direct cause of the fracture. This opinion, however, was quite opposed by Mr. Law. On being questioned by Mr. Balfour, who represented the North British Railway Company, Mr. Law explained that there were certain defects in the workmanship of the bridge, which rendered its actual strength inferior to that which the design was capable of giving, if it had been thoroughly carried out. He concluded by saying, that even if the workmanship had been sufficient the basis was not, and that the system of bracing was inadequate.

On the 27th, Mr. Law was examined by Mr. Webster, Q.C., who appeared for the contractors. He then stated that he had calculated that the present ironwork, together with the brick base on which it stands, and the cylinder and the caisson, weigh together 1,584 tons. The weight of the brick pier originally calculated would have been 1,528 tons. The present pier cost 2,636*l*., the brick pier would have cost 1,361*l*. Mr. Rothery called attention to the resistance to the wind afforded by chimneys of 380 ft. in height between Glasgow and Dundee.

On the 29th, Sir George Airey, the Astronomer Royal, gave evidence. He stated that the greatest recorded velocity of the wind at Greenwich was on the 8th of December, 1872, when it attained 57 miles per hour, the corresponding pressure being 50 lb. per square foot. In the storm of the 2nd of March, 1880, the pressure was about 30 lb. The Greenwich records of the 28th of December, 1879, did not record a pressure of more than 8 lb.; but the Observatory was out of the track of the storm, which was so violent in Scotland. Sir George was questioned as to the allowance of 10 lb. per square foot resistance which he had recommended as adequate for the Forth Bridge, and explained that the effect of the wind on a suspended structure would be far less dangerous than on one placed on lofty rigid supports.

Professor Stokes said that the experiments on wind pressure hitherto made have been on a small scale, and have shown that the wind-pressure was pretty much in proportion to surface. It is, however, desirable that exhaustive experiments should be made over large surfaces. The anemometer of Dr. Robinson is used for measuring the wind, and when the cups of that instrument go at a velocity of 40 miles an hour, the velocity of the wind is taken at 120 miles an hour. The relation between the velocity and the pressure of the wind, hydrostatically tried, is in the proportion of 1 lb. on the square foot for a velocity of 20 miles an hour. To that has to be added 80 per cent. according to some authorities, and 100 per cent. according to others, for the pressure of wind of the same velocity on a plate.

Mr. Robert Henry Scott, secretary of the Council of the Meteorological Office, produced the records of the storm of the 28th of December, 1879. The greatest velocity registered in any one hour was 71 miles per hour at Glasgow, between 6.20 p.m. and 7.20 p.m. The velocity at Aberdeen was 96 miles per hour. The greatest velocity recently registered has been from 83 miles to 84 miles per hour for the mean of sixty consecutive minutes; but Mr. Scott said that he had no dates for estimating the possible maximum velocity for a shorter period of time, or in the Tay Valley. He did not believe that high velocities are due to whirlwinds, but that they are gusts in the nature of waves. Some of these gusts may have a small lateral extension. In the gale in question, one of them extended considerably over 300 ft. in width. It occurred at Strontian, when it unroofed the house of Sir T. Riddle, and carried the roof over the garden-wall, a distance of 100 yards.

On the 30th ult. Sir Thomas Bouch, the engineer of the bridge, was examined by Mr. Bidder. Sir Thomas deposed that before the commencement of the bridge he had borings made in the bed of the river by experienced men; and that the result was the delineation of a rock foundation for nearly the whole length of the bridge, with the exception of 250 yards on the north shore. The rock was shown at depths ranging from 3 ft. to 35 ft. On sinking the cylinders for pier No. 15 it became apparent that the borers had been mistaken, and that what they had taken for live rock was only a hard bed of gravel, some 3 ft. or 4 ft. in thickness, beneath which was clay. On this discovery being made, the design of the bridge was altered. The number of piers was reduced, the spans being proportionately increased, and iron was substituted for brick in the upper portion of the piers. A lattice form was adopted for the girders, as that which presented least resistance to the wind, and which his experience of twenty years had led Sir Thomas to consider the best. The result of the change was to put a pressure of about three tons to the square foot upon the foundations. As to the execution of the work, the engineer deposed that he appointed thoroughly competent men, and believed that they did their duty. It had become evident since the failure of the bridge that there were imperfections in the work, which he would have corrected as they arose, if he had been aware of them. But the unequal thickness of some of the columns, as to which evidence had been given, had in no way contributed to the disaster.

The cardinal part of the evidence of Sir Thomas Bouch, however, is of such importance that we give it in the words of the report.

Mr. Bidder.—"Had you in your mind the question of wind-pressure as one of great importance, which must be carefully discussed?"

Sir T. Bouch.—"Yes."

Mr. Bidder.—"There was great obscurity, and very little determinate knowledge on the subject of the amount of provision which should be made for the wind-pressure?"

Sir T. Bouch.—"Very little indeed. In these circumstances we applied to the Astronomer Royal, and his opinion was that 10 lb. per square foot should be provided against in this bridge."

When this statement is compared with the evidence of Mr. Law, it will be seen that, taking what was regarded as the best available meteorological advice on the unknown amount of the force of the wind, Sir Thomas Bouch gave to his work a stability nearly fourfold that of the estimated strain. It might have been more convenient if this evidence had been given before that of Sir G. Airey. We shall not attempt to anticipate the course which the inquiry will take, but in any event it is matter of satisfaction that the engineer has so much to say in evidence of the forethought which he gave to a subject on which it is now only too certain that we all had so much to learn.

* See p. 552, *ante*.

THE LIMIT OF THE RANGE OF THE DIVER, AND THE NEW ATTEMPT TO INCREASE IT.

To receive with cynical incredulity the announcement of a new and startling invention is as unworthy the scientific man as it would be to accept such tidings with unhesitating eagerness. We are in the age of inventions, and for our own part we believe that we are only at the dawn of that age. At the same time, the more fully any one is familiar with inventions and inventors, the more thoroughly evident to him is the danger of losing the comprehensive grasp of the whole, in an attempt greatly to improve a part. And the first point always to bear in mind, on hearing of any new triumphs of mechanical or physical genius, is to ask ourselves whether all the conditions of the problem have been duly provided for by the inventor.

We are now told that a young German, of the name of Fleuss, who has been for some time in the service of the Peninsular and Oriental Steamboat Company, claims to have invented an apparatus by the aid of which he can remain for five hours, or more, under water, without any means of communication with the surface. The apparatus is described as consisting in the ordinary diver's dress, connected with which is a re-

ceptacle for compressed oxygen, from which the required amount of that vital element is supplied for the purpose of respiration.

So far, we see no impossibility in the scheme. It is added, by its advocates, that the mode in which the diver will thus be enabled to dispense with the tube, through which, in most existing diving arrangements, the air for respiration is sent down by an air-pump, will give a freedom and independence to his action under water that will open a new chapter in the history of submarine possibilities.

As to this, however, it is easy to exaggerate. We do not deny that danger and inconvenience attend the use of the tube. Danger and inconvenience are inseparable from diving, and it will always be a question of the more and the less. But we do not suppose that any one competent to deal with the subject would take the risk of allowing a man to remain under water without a life-line, or means of direct and constant communication with the men above. Indeed, this is admitted by the proposers of the new scheme. It would, of course, be more convenient to have a single hempen or silken cord from the diver to the surface, than to have this accompanied, as at present, by an air-tube. Cases of entanglement at times have occurred, and the lighter the encumbrances of the diver, of course, the better. Still the difference between life-line alone, and life-line and air-tube (which it is possible so to arrange as to avoid either the risk of entanglement, or the chances of the pull of the line coming on the tube) together, is only one of degree; and it is not clear to us that the extra facility afforded by the use of one line alone would be quite so material as is represented.

Thus much as to the advantage proposed, supposing the scheme to be effective. But there is one point which seems to us to have been overlooked, if not by Mr. Fleuss, at all events by those who have described his scheme. The diver is subjected to two distinct causes of inconvenience, besides the general difficulties afforded by the medium in which he works. He is subjected not only to hydraulic pressure, but also to pneumatic pressure. Attempts have been made to relieve him from the first. Some forty years ago an apparatus made in America was brought to London, and known by the name of Taylor's "Submarine Armour." Instead of the ordinary diving-helmet and Macintosh dress, an air-tight suit of copper armour was provided, which not only kept off the pressure of the water from the body of the diver, but also afforded him protection from the sharks, which fish are the terror of the pearl-divers. But it must be observed that the diver requires to have his hands free; so that the pressure at the wrist from the ligatures needed to keep out the water, and on the hands themselves, will always be that due to the depth of water operated in.

This apparatus, however, ingenious as it was, by no means diminished the pneumatic pressure, which remained proportionate to the depth of water, and which we may take in round numbers at one atmosphere, or 15 lb. per square inch, in addition to the pressure on the surface, for every five fathoms of depth attained by the diver. And it is rather to the pneumatic than to the hydraulic pressure that the great inconvenience suffered by the workman is due. It is the former, not the latter, that causes bloodshot eyes and deafened ears, and oppressed breathing. This is felt in the diving-bell as well as in every form of diving dress. In fact, at a depth of 30 ft. Mr. Brunel found that he could hold his breath for two minutes, or double the usual time, in consequence of taking a double amount of compressed air into his lungs at each inspiration.

Now, no means of providing oxygen can be of any use for the purpose of supporting respiration, without they are accompanied by the withdrawal of the carbonic acid gas formed by the respiratory process. This must be allowed to escape; and it can only escape by raising a valve, weighted with the hydraulic pressure due to the depth. In whatever way the oxygen be supplied, this back pressure will remain on the lungs of the diver. There does not, therefore, seem to be any good reason to anticipate that a greater depth than that now attainable (the maximum of which, for practical purposes, is taken at from 15 to 20, or at the utmost 22 fathoms), is to be reached by the use of an independent supply of air. The idea of carrying such a supply of air with the diver is not new. A diving apparatus with an attached "air-knapsack" is figured in Knight's "Practical Dictionary of Mechanics," and Philip's "Submarine Armour," which resembles that to which we before alluded, except that there is no helmet,—the body and head-piece of the armour being in one, like the cephalo-thorax of a spider. Thus the idea of free motion underwater, unimpeded by the need of attending to the air-tubes, is not now for the first time brought forward,—a fact which suggests that no practical advantage has been found to result from the method.

Indeed, our own experience in the matter would lead us to look rather in the opposite direction from that of independent air supply for any case in which it might be of extreme importance to get below the 20-fathom line. With armour to protect the diver from the direct pressure of the water (which below the depth we have mentioned squeezes the natural fluids out of the body), it might be possible to relieve the pneumatic pressure by the use of a return air-tube to convey the expired air to the surface. We mention the project with reserve, as the experiments which, now many years ago, we instituted on the subject were only made in comparatively shallow water. But if by any means greater depth is to be obtained by the diver, it can only be by some mode of lightening the pneumatic pressure. It is that which, whether in the bell or in the dress, fixes the real limit of practicable descent. We do not see that any attempt to deal with that part of the difficulty can be combined with any apparatus for compressed air, as in the air knapsack, or compressed oxygen, as in the apparatus of Mr. Fleuss.

There may be something more than this in Mr. Fleuss's invention, but that remains to be seen. He is now exhibiting his feats at the Royal Aquarium.

THE GREAT PYRAMID INTERIORLY.

WE have often enough thought of how very imperfect our notions of the past would necessarily be without taking into account the part which "building,"—to use a word of wide meaning and significance,—has had in it. Never, perhaps, was this fact made more evident and certain than in the existence, design, and motive of the Egyptian pyramids. A notable mark in the world's history would be effaced without them, and we should scarcely be able to realise the history of Egypt herself without the giant structures which have so helped to make her world-famous. We have already said a few words as to their external aspect and design, and on the impressions they are calculated to make on the mind, and to permanently leave on it, after due observation; and we would now say a few words on their interior designing and purpose, and on the impressions made by them, which grow stronger the longer looked at and studied. The pyramids of Egypt stand alone in the world, and, as records of poor humanity, have no rivals. We cannot but think that any note or fact concerning them, by calling attention to them, must needs help in adding to the protest which all who take an interest in "antiquities" must needs join in making against their destruction, or even their spoliation.

We might ask why it was that the pyramid form at all was selected for the purpose of a king's tomb,—what was there in the minds of those who built it so especially striking or suggestive that so simple an outline should be selected for it, without regard even to size?—but that it has been pointed out again and again in these pages that the finished pyramid is but the outcome of the heap of stones rudely piled up over a grave. Nowadays, when all forms for such purposes are borrowed more or less from a past state of things, both architectural and otherwise, it is not a little difficult to even fix upon a new or untried form. Here it might well puzzle the curious to say how the strange inner arrangements of its passages and chambers originated. The King's Chamber in the centre of the Great Pyramid is but a small and narrow room, built but to contain a stone coffin, and all else in the structure contrived only to conceal this, and to render it all but impossible to discover it, or even to suspect its existence. And in addition to this, there is, close to the narrow chamber of the dead, in the low passage to it, an ingenious contrivance to block up even this narrow way to it, a stone portcullis fitting into grooves which, after being once lowered, would seem to have hermetically closed the narrow chamber with the little it held, in a built-up mountain of stone to hide away, and yet to invite curiosity.

It is striking, indeed, to find what an amount of pains has been taken to conceal the way to the narrow chamber which held the still narrower coffin in which the body of the king lay. The outer "casing" of the pyramid was continued over the doorway and passage of entrance, and this was not in the centre of the face of it, but on one side, so that accuracy of measurement did not help to the finding it. Next, at the angles where the passages of entrance into the chamber met, blocks of granite were placed; and at the entrance into the king's chamber itself, no less than four portcullisses of granite, sliding in grooves, were placed, thus to form an all but impenetrable barrier; and all this was done evidently for the sole purpose of concealing the very way to the narrow room and final abode of the dead king. Nothing would seem to have been omitted, or to have been unthought of, to do this in the most effectual and perfect way; and the whole of the huge structure thus formed but the stone covering to the hiding-place of the poor mortal remains. A mountain of stone was piled up over them, thus to hide them for ever; but with all this,—and this is really the singular part of it,—there was an evident intention on the part of the architects, and contrivers, and builders of the pyramids, or, at the least, the greater ones, to do somewhat more than simply to build a tomb, and then to leave it.

It is impossible to look attentively at a section of the Great Pyramid without coming at last to the conviction that the first idea in the mind of the builder and contriver of it was the raising up of a stone mound or hill, in the interior of which the body of the great king was to finally rest in the still and stately chamber formed in it. The idea evidently was not so much the raising of a vast pyramid of stone and granite over and around the venerated body, as the entombing of the body in it *after* it was raised. The sarcophagus in which the body was to rest, as was imagined, for so many generations, was brought into the chamber, formed in the very body of the stone hill ready for it, and prepared for it, and the several parts round and about it were but for the purpose, as will be seen, of emphasising the ceremonial observances, all of them sufficiently elaborate, gone through on the occasion of the burial of every Egyptian sovereign. The huge structure of stone blocks being built up, as one of Nature's mountains, the object evidently was to approach the small chamber or chambers in it by the smallest and narrowest possible road, about 4 ft. square, just sufficient, indeed, for the sarcophagus to pass in its passage, may be with the dead body of the king in it, from the outer world to its narrow and final resting-place.

We must needs here pass by a number of details in the planning and construction of the Great Pyramid, for we are now more particularly dealing with the general idea in them all, and in pyramid construction generally; but it may be well to name them, as they serve to show how sensitive the architects and builders of antique Egypt were to many things which we now consider to be more essentially modern and scientific. We may name first the air-holes, or passages, which have puzzled so many observers, running from the inner chamber to the outer air. There is no doubt now as to their object,—the ventilation of the chamber. Colonel Vyse cleared out one of them, and it is a little singular that the ends of them are close to the floor of the room, and that a bend or angle is taken a short distance from it. The five open spaces or rooms above the king's chamber were evidently constructed to take off the weight from the roof of the room, there being some 300 ft. depth of solid stone about it! The portcullisses before named speak for themselves. They were simply the solid granite doors, here four in number, to close, as was thought, everlastingly, the narrow stone room in which the dead body lay, or may be in the old Egyptian's way of regarding it,—the long sleep of the body of the king. Very much that is of the old world meets us here well worth further and deeper looking into, for the material pyramid, huge as it is, is but the expression and the record of it.

But more than this, strange and out of the way as it is, that portion of the way or passage to the sepulchral chamber which has been called in the guide-books the "Great Gallery" is the most impressive, and the most difficult to find the precise object and special meaning of. After the so-carefully-concealed entrance, and the long, narrow, and steep passage, we come at once into it, and it is found sufficiently surprising. It is no less than 28 ft. high, with

inclined walls and narrow roof, all of carefully wrought granite. In a perspective view of it, looking into the narrow entrance, into the very chamber of death itself, it forms perhaps the most singular structure that anywhere exists. It would be hard, indeed, to say what it could be which dictated its singular form and section. It is 156 ft. long, and is, as we have noted, entered through the narrow way or tunnel itself only to meet it again close to the portcullisses. The tunnel is about 4 ft. square, which is all that forms the way from the outer world to the narrow death-chamber. It is 3 ft. 6 in. in width, and, as we have said, no less than 28 ft. in height. There are in it, too, some singular constructive details which have been thought to have helped in some way the lifting of the sarcophagus into its place; but this can hardly have been, for, if so, why are they not elsewhere in the long length of the narrow passage? It is, indeed, inexplicable but for one singular fact, not hitherto, we think, noted. It is this. That in all the greater pyramids, and even smaller ones, a like, or nearly like, provision has been made, and a kind of "antechamber," or enlargement of the narrow way to the chamber which held the sarcophagus, has been provided. So that it must needs have been a necessary part of the very idea of a pyramid as a sepulchre or tomb, at least of a king. This idea, in a few words, was,—a hill of stone, in which was the narrow room to hold the stone coffin; as narrow a way to this as would allow only of the passage of the sarcophagus, solid and ponderous doors of stone or granite to close the mouth of the death-chamber; and then, an expansion or enlargement of the narrow way just before and in advance of the entrance into the inner chamber itself. It may be not a little hard to hint at an explanation of this singular addition to a pyramid, but of the fact that such gallery, as in the Great Pyramid, served some most important purpose, there can be no sort of doubt. May it not have been connected with the actual burial of the king,—a place of rest for the body before its final entombment, and before the final lowering of the ponderous stone doors which, as was thought, were for ever to hide it from mortal sight? Of its singular and unique form, as contrasted with the studied simplicity of design of the king's chamber itself, much might be said, and might be disputed; but of one thing we are quite sure, that it well affords an additional reason for the preservation intact of the Egyption Pyramids.

THE DECORATION AND FURNITURE OF TOWN HOUSES.

CANTOR LECTURES AT THE SOCIETY OF ARTS.

MR. EDIS, F.S.A., delivered the third lecture of this course* on Monday, April 19. In it he considered specially the treatment of furniture, which, he said, meant the fittings of a house which were movable and transportable, but he thought that many of them ought to be in the nature of fixtures, and should be the work of the carpenter rather than the cabinetmaker. What was wanted was utility and comfort, combined with a careful regard for grace and harmony of design. It would be well for English art when architects, sculptors, and painters ceased to regard anything too insignificant to require their attention, when, like the artists of the Middle Ages, they aimed at producing a harmonious whole. Furniture followed, to a great extent, the architectural style prevailing at any one time, said the lecturer, who, proceeding to describe the changes that had been made during the last four centuries, alluding at some length to the demoralisation of taste which followed the Pompeian fashion at the beginning of this century. The result, he said, had been a miserable jumble, which pictured no condition of human life. In our day we required cabinets to contain objects of art which we desired to be seen by our friends. These were not to be hidden behind doors elaborately panelled and carved. The fifteenth and sixteenth century work was made more for show than for use, and the result was it contained nothing straight or regular. It was always clever, and, notwithstanding its caprice, it was sometimes elegant. Referring to the work of Chippendale, Sheraton, and others of their time, the lecturer said it was characterised by suitability of form, and he thought that manufacturers might produce furniture after these designs at much lower prices than people at present demanded. The expensive carving need not be reproduced; all that was wanted was the simple excellence in design and honesty in construction. But the fact was the public did not show in house furnishing the common sense they exercised in other matters. They would not accept the advice of skilled artists, and in carrying out their vulgar, extravagant ideas, they were misled and charged excessive prices by the first uneducated dealer with whom they came in contact. It was said that furnishing was only a question of taste, but Mr. Edis insisted that it was a question of educated taste. Proceeding to articles of furniture in detail, he said that everything must be fitted for its purpose, not extravagant in design, absolutely useful, and if a chair or couch, absolutely comfortable. Cabinets were made to hold artistic objects, and need not be, therefore, extravagantly ornamented. Tables should be strong and well made, and the legs should not be twisted into exaggerated forms. Sideboards were not wanted to resemble a classic shrine, with wine-coolers underneath after the form of ancient sarcophagi. After describing a sideboard, simple in design and made to be really serviceable, Mr. Edis said that window-openings were not, as a rule, half utilised. Comfortably-stuffed seats or divans should be placed there, and if these were made as boxes they would be useful for newspapers or magazines, and in bedrooms for clothes or any purpose desired. The space above wardrobes should be filled up to the ceiling with a press, in order to abolish the dust-trap on the top. The mantelpieces in modern houses were generally of a mere commonplace character, abominable in design and in construction. To leave these standing would destroy all decorative effect, where everything else looked well, and they must be got rid of at once. In olden days mantelpieces were the most important feature of a room, and there was no reason why they should not be dealt with artistically now. After referring to fenders and grates, the lecturer concluded by saying that by the exercise of true artistic effort, furniture might be produced at moderate cost, beautiful in design, form, and detail, for everyday use. Everything in a house should be fitted for a place and intended for a purpose, should form part of a whole, and should accord with the beautiful. Were this the common rule, our houses would exercise an artistic influence as yet hardly known.

Mr. Edis delivered his fourth lecture on Monday, the 26th ult. In this lecture he offered practical suggestions for the decoration and furniture of the entrance-hall, staircase, dining-room, and library. Before discussing the special arrangements of individual rooms, however, he said that a few general hints as to paint, paper, and distemper work, would assist his hearers in arriving at something like the cost of the work they might propose to do, and aid them in their dealings with the workmen. English wall-papers, he said, differed from French, in being made 21 in. instead of 18 in. wide, so that a piece of English paper of 12 yards in length would cover seven square yards of wall-surface as against six square yards of French paper. The cost of hanging ordinary paper varied from 1s. to 1s. 6d. per piece, increasing from 2s. and 2s. 6d. per piece for better-class papers in which there was much gold,—a greater amount of care and time being required for these,—to 4s. and 5s. per piece for flock papers, all of which had to be trimmed with a knife, a much longer proceeding than the usual one of trimming the edges or cutting off the waste pieces with a pair of scissors. Lining-papers for walls and ceilings cost from 2s. to 2s. 6d. a piece, hung complete. These, as a rule, were only necessary where the general surface of the walls was very rough and uneven, and where it was intended to paint or distemper the whole surface, and in ceilings where the plaster-work was bad or defective, or much cracked. The cost of what was technically called "washing-and-stopping" (*i.e.*, cleaning off the old distemper, and cutting-out, filling-in, and rubbing-down all cracks in old ceilings) would depend very greatly on how much of such making-good had to be done; but with ordinary walls or ceilings the cost, including plain sizing and distempering, varied from 3d. to 6d. per square yard, all stencil decoration and picking-in of cornices with colours involving, of course, extra expense. The cost of plain painting to walls, and bringing them up to a good surface in three or four coats, varied from 1s. 9d. to 2s. 3d. a yard, with 1s. per yard extra for varnishing. As a rule, few old walls would stand being varnished, the finishing of the plaster-work not being sufficiently smooth or level; for it should be remembered that varnish brought out all such imperfections in a most decisive manner. The cost of plain painting in three or four coats for the margins or general surfaces of floors varied from 1s. 6d. to 2s. a yard, finished complete, while the cost of the cheapest ordinary Brussels carpet, three-quarters of a yard wide, was at least 5s. 6d. per yard run, or practically nearly 7s. a square yard, exclusive of laying. Painted borders were not only more healthy and artistic, but much less expensive than covering the whole of the floor surface with carpet. It was well to remember that different materials needed different treatments, and much depended on the nature and appearance of the work to be painted. Delicate tints required colourless oil for their vehicle, and surfaces required to be finished-in flat must have no oil at all, as the use of it necessarily imparted a glossy and shining surface. Paint mixed with turps was not nearly as lasting as that mixed with oil, but a little turps was necessary in all work exposed to the sun, either inside or out, to prevent the paint from blistering. As a rule, where shutter-fronts and other painting in the window openings blistered, the work had been improperly done. The silicate paints now made, having for their basis pure calcined silica, were said to stand any fair amount of heat without blistering, and, weight for weight, to cover at least a third more wall-space than ordinary oil-paints,—both valuable recommendations for their more extensive adoption for every-day use. Coming to the immediate subject of his lecture, Mr. Edis said that the street-door should be painted in some warm serviceable colour,—either chocolate or brown,—and varnished for protection against the weather and to render it capable of being easily cleaned. The walls of the hall should be painted with some good serviceable colour,—not too light to show fingermarks,—to two-thirds of their height, with some simple pattern stencilled over the surface, but, if possible varied, *i.e.*, light upon dark and dark upon light, and the whole carefully varnished, not only to protect the paint, but to enable the walls to be easily cleaned without damaging them. The stencil-work might be done in a darker or lighter shade of the general tint, and here and there a panel might be formed in which a figure might be painted in outline, or stencilled on. Such figure-work, however, should be done by an artist who knew from long study how to draw the human form, for any feeble prettiness of figure-drawing, such as was so often to be seen in the panels of modern furniture, and on tiles, was worse than nothing. In the frieze there might be panels containing birds and figures, which could be done in distemper with good effect, the general drawing being done in plain red outline, contrasting well with a cream-coloured general tone of ground. Panels of figure tiles, which lasted for ever, or a plain running stencil pattern of foliage, shields, and birds, as an enriched border below the cornice, might be judiciously introduced, or a good light-toned and simple patterned or stamped paper might be hung over the whole space instead of distemper. The ceiling should be lightly tinted in a vellum, pink, or grey tone, with some slight stencil decoration to relieve it, and the cornice treated in very light shades in distemper. Marble mosaic tiles might be used with good effect on the walls on the outer hall, at a cost varying from 12s. to 20s. per square yard. The woodwork should be painted throughout in two plain colours, with the mouldings strengthened in darker tone, and the whole varnished. Indeed, all woodwork, such as doors, windows, and shutters, subject to the wear of not always clean hands, should be varnished throughout. The extra cost of it would be saved by the increased time which it would stand, and plain washing with a damp cloth or sponge would easily clean it. "Mischiata," or marble mosaic, formed an excellent pavement, and although more expensive, was preferable to the everlasting pattern-tile floors, which had been imitated *ad nauseam* in oil-cloth. The ordinary cold and dreary staircase of a London house might be made more cheerful by a painted and varnished dado, with a wooden moulding raking with the handrail, and the wretched cast-iron balusters, if they could not be got rid of, could be painted in a plain, bright colour, not picked out in gold to show their peculiar eccentricities and faults of design,

* For reports of the first and second lectures see the *Builder*, pp. 454, 486, *ante*.

and the thin moulding which served as a hand-rail might be ebonised as a contrast. Above the dado the wall might be either distempered or papered in some warm and cheerful colour. The paper should be of one general tone. As an example of paper decoration for inner halls and staircases, the lecturer pointed to one exhibited by Messrs. Jeffrey, and designed by Mr. Walter Crane. Passing on, the lecturer said he could not pretend to lay down any set rule for the decoration of the principal rooms of a house, nor would he if he could. The great mistake that was made nowadays by some professional decorators was in fixing all design and furnishing in a room to one set rule, so that on entering one felt that everything was stiff and formal, intended for show and not for use. The lecturer had heard recently of one of those gentlemen informing a lady of excellent taste, and who had brought into her room various bits of eclectic but useful furniture, that "had he known she was going thus to interfere with his general set scheme of decoration, he would have declined to have anything to do with the work,"—a remark at once impertinent and characteristic of the general conceit of such false teachers. If such a room could speak it would cry out aloud,—"Look at me! Am I not an art-room? But please do not bring any pretty things,—any books, or any china,—here, or you will disturb my propriety! I am not intended to be home-like, but artistic!" The French rarely or never furnished the *salle-à-manger* or dining-room to any great extent. In England, we used this room much more largely, and should make it as pleasant to look at as possible, care being taken not to hang the walls with tapestry, silk, or other stuffs which retained the smell of food. A painted dado of good dark tone, with a bold chair-rail to prevent the chairs damaging the walls, was generally desirable, or plain deal painted panelling to a height of 3 ft. or 4 ft., above which the walls might be painted or papered to within 2 ft. or 3 ft. of the ceiling. The wall, so divided, would give ample space for the hanging of pictures or prints, and instead of the ordinary picture-rods under the cornice, with their long pendent lines of dusty cord or wire, cutting up the wall into endless queer and bad forms, a small moulding should be placed along the walls under the frieze, into which hooks could be screwed and removed at will, or a light iron rod—ordinary gas-piping would do—might form the lowermost moulding of the rail, on which any number of pictures or drawings might be hung. If the wall was to form a background for pictures, a good warm brown or chocolate colour, in paint or distemper, would be found most effective. There were innumerable colours which could be adopted without having recourse to the dreary common-places of light-apple and sage-greens, which seemed to be the only colours thought appropriate for dining-room walls. The lecturer dealt in great detail with the decoration of the dining-room and library, insisting that truth and beauty of form and colour, combined with fitness and common-sense, were the main elements of all true artistic treatment in decoration and furniture.

In his fifth lecture, delivered on Monday evening last, Mr. Edis treated of the furniture and decoration of drawing-rooms, bedrooms, nurseries, servants' rooms, &c. The lecturer observed that the drawing-rooms of a London house should be the rooms, of all others, in which good taste, both in decoration and furniture, should be everywhere apparent. The walls should be pleasant to look upon, not cold and dreary blanks of mere one-tinted paper, and the furniture should be essentially comfortable. The rooms should, above all, look and be home-like in all their arrangements. Any scheme of decoration which should consist merely of so-called artistic papers, arranged in two or more heights, in the present indiscriminate fashion, without reference to the proportion of the rooms, high or low, long or square, or stiff, spider-legged furniture of would-be quaintness in make or shape, covered with *créton* or stuff more or less matching the paper—anything, indeed, that should give a cold, comfortless, not-to-be-touched appearance, a sort of culminating finish of so-called high-art decoration, was as much a mistake as the dreary, lifeless formality of the gilt and gingerbread type of imitation French work so long affected. The art-work in the room should assist, not take away from, its home-like feeling. The one unfortunate thing for decoration now-a-days was the everlasting seeking after some novelty in papers, curtains, or other hangings. Everybody wanted to have a room different from his neighbour's. Decoration was being done as a fashion, not from any real love of it. Without in any way seeking to object to or to despise real individuality or originality in art-decoration, the lecturer said he must protest against the craving after eccentricity and so-called novelty which was called "originality," and the striving after quaintness, bad in taste and effect, which was called "individuality." The individuality of the true artist would show itself in many ways throughout the house,—in the tone and treatment of the colouring and furniture of the various rooms, in all of which there would be grace and beauty and harmony of general effect and contrast, so that although there might be, perhaps, a distinct difference from other houses, marking the artistic individuality of the owner, there would be no stagy and striking effects, no glaring colours or fantastic forms to tire and offend the eye. Any room or house decorated after some set form, so that it should be stamped as the work of this or that fashionable decorator, was utterly a mistake. The aim of all true artists should be so to design and decorate the buildings of to-day that they might be looked upon as equally beautiful, equally artistic, and equally appropriate a hundred years hence, and so that as we, to-day, looked with pleasure and admiration on the work done 2,000 years ago in Pompeii, so might we have decoration in our day and generation which in future times should be looked upon with equal pleasure and delight. Mr. Edis went on to say that he could conceive of nothing more opposed to all true decorative taste than to have one room Pompeian, another Mediæval, and a third "Queen Anne," while, to complete the anachronisms of the house, a fourth should be gilt and carved to imitate a Chinese joss-house or an Indian temple; if the general effect were not vulgar and trashy, it would be suggestive of no real individuality of thought or feeling, but rather of the poverty of invention and artistic design which found shelter under the adaptation, bodily, of other men's work. The true artist should have an ideal of his own of simple refinement and graceful completeness, which would save him from the temptation of extravagance. As a rule, it was the mere decorator who made art-decoration costly and extravagant: he or she could not see that simplicity of colour and treatment were better than all the heavy work of set patterns, all the colours of the rainbow, or all the gold they could use. For a drawing-room in a large house, where to a certain extent it was required only for great entertainments,—the ladies' sitting-room and general friendly reception-room being provided for in some smaller room in the house,—a rich and effective treatment of the wall would be with a low-panelled dado of dark black, with delicate inlaying of ivory-toned ornament, the doors and general woodwork being painted to match, the general wall-surface coloured yellow and powdered all over with a flower pattern or diaper of a darker tone of golden brown, the frieze being coloured a delicate vellum colour or ivory tone, with arabesque or figure decoration in black, the cornice treated with delicate shades of brown and green, and the ceiling slightly tinted to match the frieze. By the courtesy of Mr. Crace, who had devoted his life to decoration, the lecturer was enabled to give details of several representative examples of the treatment of drawing-rooms and boudoirs decorated by Messrs. Crace. In continuation, Mr. Edis said that in the country, away from dirt and smoke, wall-hangings, whether of silk, tapestry, or other stuff, might often be used, and would give an air of comfort and completeness which could not be obtained with mere paper-hangings, beyond which there was a play of light and colour in a woven fabric hanging on the wall very different from the absolute flatness of tone resulting from paint or paperhangings. Embossed leather papers, with their rich tones, the slight play of light from the low-relief surfaces, and with their hard varnished surfaces, afforded an excellent wall-covering at a cost varying from one-third to one-sixth the price of leather. They were, perhaps, most suitable for libraries, dining-rooms, and smoking-rooms, but they might occasionally be used in drawing-room decoration with good effect. The present age of luxury was, if anything, rather a curse than a help to true art-feeling, so much was done for show and effect, and so little from the real love of the beauty and grace of real art. Homes, not museums, were wanted. At South Kensington, in the refreshment-rooms, there were many suggestions for interchange of colour, but all carried out utterly regardless of cost, and the walls were much too overladen and crowded with detail. In any decorative treatment that might be adopted, it should be, above all, remembered that the walls, while bright and glowing in colour, should have no staring patterns or design which would give to the educated eye a feeling of discomfort and unrest, and tend materially to destroy the general harmony of the room. The good taste and agreeable effect of a room would depend much upon the skill with which the wall surface was divided, and by the contrast and arrangement of the colouring and general belongings of the room. All kinds of tricky glaring conceits and eccentricities in colouring were equally wrong in house decoration as in a lady's dress,—there should be, throughout, grace and beauty of design and colour, and quietness and repose of ornamentation. The decorative treatment of some of the rooms in the Prince of Wales's Pavilion, by Messrs. Gillow, and of some of the rooms in other houses in the "Street of Nations" at the Paris Exhibition, by Messrs. Jackson & Graham, Shoolbred, Trollope, and Collinson & Lock, together with the design and execution of the various examples of furniture, were especially good, the boudoir of the Princess of Wales, by Messrs. Gillow, and the drawing-room in Messrs. Collinson & Lock's house, being especially noticeable for delicacy of colouring and harmony of general effect. Passing on, the lecturer dwelt at some length on the furniture and decoration of bedrooms, nurseries, and servants' rooms, not forgetting hygienic considerations, such as the provision of ventilation, and the minimising of carpets and hangings of all kinds. He strongly deprecated the fashion which he said was endeavouring to revive the wooden bedsteads of our ancestors, whether with or without the heavy posts and canopied superstructure. Nothing could be better or more cleanly than the painted iron or brass bedstead, with, perhaps, some light hangings, cheerful yet subdued in colour. For the day nurseries he advocated the embellishment of the walls not only with some of the admirable illustrations which appear in the weekly and monthly periodicals, but with the coloured pictures from the Christmas books which Mr. H. S. Marks, R.A., Miss Kate Greenaway, and Mr. Walter Crane have illustrated, together with the coloured pictures issued with "Christmas Numbers," and the pictures from books of fairy tales. By such means, he contended that the children's home might be made a bright and cheery spot, and the means of teaching would be afforded in more pleasant guise than that of lesson-books. Those who valued good servants would, the lecturer observed, not forget that their rooms should be made bright and cheerful. In conclusion, Mr. Edis said that in his sixth and last lecture, to be delivered on Monday evening next, he would endeavour to treat of the general articles of domestic use.

We may add, that during the delivery of these lectures the walls of the hall have been hung with specimens of curtain stuffs and paper-hangings exhibited by Messrs. Jackson & Graham, Collinson & Lock, Jeffrey & Co., and other firms. Messrs. Frederick Walton & Co. have also exhibited their patent *Linoleum Muralis*, or Sunbury Wall Decoration, a material capable of use in many situations with excellent effect.

Barnsley.—The notice given by the master builders of Barnsley on the 1st of January expired on the 30th ult., and a general strike was expected. The masters gave notice for a reduction of ½d. per hour, and an extension of the working hours from 50 to 54 hours per week. The masters withdrew the notice so far as the hours were concerned, but agreed to enforce the reduction. During the week the men's secretary sent a note to the masters' secretary, stating they would agree to a reduction of ½d. per hour. The masters, at a meeting held on the 29th ult., agreed to enforce the full amount; and on the 30th the secretary of the Masons' Union gave notice that the reduction was accepted. The bricklayers, however, agreed to come out on Saturday last. The masons will work 50 hours per week, but they submit to a reduction of 2s. 1d. per week in their wages.

THE LEGAL POSITION OF BUILDERS IN RELATION TO BUILDING OPERATIONS.

The position of a builder in the metropolis, or in any of our large towns, is in many respects one of not a little difficulty. We say nothing of the delicate position of a master-builder in regard to wages and the combinations of workmen, which have added much to the cares of all large employers of labour in recent years. But as soon as he begins to perform any kind of building operation he has to be careful that he is not overstepping some part of the law, or some municipal regulation which he may for the moment have overlooked. He has in London at least to be well acquainted, for example, with the Metropolitan Building Act; and in regard to his relations with his employer, he has to some extent to be aware of those principles which govern the relationship between architect, surveyor, builder, and employed. The decisions collected in Roscoe's "Digest of Building Cases," and the disputes which from day to day are known to arise, sufficiently testify to the legal difficulties which beset builders. Quite recently Mr. Justice Fry has given a decision which, at the expense of one builder may be of a good deal of service from this point of view to his professional brethren; for the case of Fritz *v.* Hobson (42 *Law Times* Reports, 225) has thrown not a little light upon the legal position of builders in relation to building operations.

Two propositions were pretty clearly established, or one might perhaps say more properly, elucidated by this decision, because it can hardly be said that they are new principles, but rather old principles applied to newer, or at any rate novel facts. The first of these is that the public must submit to the inconvenience necessarily occasioned by the repairing of a house, but if the operations are carried on for an unnecessary time, or in an unreasonable manner, so that some individual suffers particular damage of a direct and substantial kind, through the infliction of some injury, then that he has a right of action against the builder. The proposition, limited to the extent of time and injury to the public, so that the operations become a public nuisance, making the author of them liable to an indictment, was laid down in nearly the same words by Lord Ellenborough in 1812, in a Nisi Prius case tried before him in London. But we are not aware that the proposition, as we have stated it above, has ever been formulated in the direct manner in which it may now be found, before Mr. Justice Fry did this service in the recent case of Fritz *v.* Hobson. The circumstances of that case serve as an example by which this proposition may be made clearer, because the bare enunciation of a legal principle is in no sense either satisfactory or thoroughly intelligible without an observation of the way in which it is put into practice. The second proposition, — to state it before dealing with the facts generally,—was that a man has a private right of access from the road to his premises, which is a thing quite different from the public right of using a highway, and that if that right is unlawfully interfered with, the owner of such right may recover damages from the wrongdoers. To some extent, of course, this proposition is included in the larger one which we have already adverted to, but it is well to keep it distinct, because the first does not necessarily include the second. This principle, too, is not by any means quite a novel one, but, so far as we are aware, this is the first time that it has been discussed in regard to building operations, or in a manner so as to throw light upon the position of a builder who is engaged in some kind of work for an employer.

To advert, however, to the facts of the present case. The plaintiff was the owner of a house which on one side had a frontage to Fetter-lane, and extended also up a narrow passage from that street, which led to Fleur-de-Lis-court. We may put the Fetter-lane frontage, however, on one side, and confine our attention to the part which extended along the passage, for in this passage were the entrances to the house and shop. The block of building upon which the builder, Mr. Hobson, was engaged was in a close and crowded neighbourhood, and the most convenient access to it was by means of what we may call,—as it was called during the trial,—"the plaintiff's passage." The building site could, however, be approached by two other passages, Crane-court, leading from Fleet-street, and Fleur-de-Lis-court, leading from the southern part of Fetter-lane. But, as we have said, there was no question that plaintiff's passage was the most convenient, for not only was it the shortest, but it also led to that part of the property which was used as a yard for the building operations. The contract which Mr. Hobson had undertaken was a large one; the cost was to reach the sum of nearly 6,000*l.*, and he had to remove a great quantity of old buildings and rubbish,—work which occupied from May 21st to July 9th. Again, large quantities of new materials had to be carried to the spot, which, again, occupied several months. Naturally enough, as it seems to us, the builder preferred to use the shortest and most convenient route, and consequently wholly made use of the plaintiff's passage, which was thus practically devoted to building operations for a long period of time, and for months these works continued, so that it became very difficult, if not at times impossible, for persons to obtain access to the premises of Mr. Fritz to buy old china and antiquities, or be measured for clothes, for the plaintiff was a dealer in ancient articles of vertu and in modern clothes. It is not necessary to examine closely the plaintiff's allegations of loss of business and custom consequent on the occupation and using of his passage by Mr. Hobson's men with their materials; it is enough to state that the judge found that, as a matter of fact, he had sustained substantial damage to the extent of 60*l.* The main question with which we are concerned, and which was the one of chief importance which claimed Mr. Justice Fry's attention, was, whether the user of the road in question was, having regard to all the circumstances of the case, a reasonable one. In the argument, the builder, by his counsel, asserted an unqualified and absolute right to approach the area of the building operations which he was carrying on by the nearest road, to any extent, for any materials, for any time, and without regard to Mr. Fritz's convenience or inconvenience. And in regard to this assertion Mr. Justice Fry spoke somewhat strongly, for he said, "Such a claim is, in my judgment, untenable. It appears to me to be the expression of the selfish and not of the social man,—of the man who recollects his rights, but who does not recollect his obligations, and human life could not be carried on if such extreme rights were asserted or insisted on." And the further result at which he arrived is concisely put in another passage of the judgment,—"To carry on the whole of the operation through what is called the plaintiff's passage was not reasonable," and he was of opinion that a large proportion of the old materials might have been carried down Crane-court, and a still larger proportion down Fleur-de-Lis-court, and thus the inconvenience necessarily created by carrying away rubbish of that character might have been distributed over the whole of the passages which gave access to the site of the new buildings. Nor was this question of different routes the only one on which the judge gave an opinion. For he also considered that, having regard to the peculiar circumstances of the case, some different arrangements with regard to the time at which the operations might have been carried on ought to have been made, for they were carried on in the busiest parts of the day, just as much as in the early morning or late in the evening. When these facts are considered, the *rationale* of the decision in this case becomes much clearer, but it is one which must obviously depend very largely on the circumstances of each particular case. If here, for example, there had been no other connexion with the building site than that of the plaintiff's passage, whether he liked it or not he would have had to submit to the inconvenience of having the passage continually occupied by the builder's men and materials, and having the carts and wagons which carried the materials to or from a distance standing in the main street, near the entrance to his passage; and every man of experience must be aware that in our large and populous towns not a few sites on which building work is going on are approached by a single narrow passage. Nor, again, if the other two passages had been very much longer, would it have been reasonable, in our opinion, for the law to have compelled the builder to reach his work by these approaches, for time and distance are money, and 100 yards further for each journey a labourer takes would, in the end, appreciably and considerably add alone to the time occupied over the undertaking, and consequently to its ultimate cost; and if a man happens to live in such a spot as that in which Mr. Fritz did, he must necessarily be prepared to put up with many inconveniences; and we are scarcely ready to endorse the judge's somewhat severe condemnation of Mr. Hobson's manner of procedure with his work. To have some carts in Fleet-street and some in Fetter-lane, might very easily be more troublesome and cause a longer time to be expended over the work than if all the carts were brought to one spot in Fetter-lane, and seeing that the plaintiff's passage was a public highway, and the work to be done was necessary, we are hardly prepared to consider that Mr. Hobson's conduct was so unreasonable as the judge seemed to think it. Moreover, obviously, dropping work at different times of the day for the benefit of the plaintiff's customers must have increased the cost of the job; for we all know that bricklayers and masons who may be working on a building near Fetter-lane or Fleet-street do not live on the spot, and if they are once there the full day will probably have to be paid for by their employer. However, the law has been laid down with perfect clearness by Mr. Justice Fry, and we have no doubt that it has been correctly expounded, and all we have doubts of is in regard to the soundness of its application in the particular case before us. That it was somewhat severely applied seems to us obvious, and, looking at the subject impartially, we confess that it appears likely, if enforced with equal strictness in all cases, to place builders in what is familiarly called a quandary. The worst of it for builders is that if, as in these cases, the judge finds actual damage has been caused to some person in the nature of the unsubstantial, or, to put it in a German fashion, the rather-difficult-to-appreciate character of loss of custom, the builder may find himself mulcted in damages of a very considerable amount. If the loss of trade at a shop in an unfashionable spot like that where the plaintiff lived causes the builder to lose 60*l.*, imagine the amount of the damages if the custom is stopped of an old-curiosity shop in the neighbourhood of Wardour-street. But as we have already said, we do not quarrel with the principle, only it seems to us that it certainly does increase builders' responsibilities in large towns if it is to be carried out with very great strictness. In the present instance our sympathies are rather with the builder than with the dealer in old china, though the little detail in which the facts are given in a legal report necessarily causes the circumstances of the case to be less prominent than the legal principles which it contains. So that we may not perhaps perfectly appreciate all the facts which came before the court. But, at any rate, builders should henceforth be very careful that they do not rashly begin operations on sites difficult of access; and when they have commenced them they should be equally circumspect in carrying them out with as much regard for the interests of those who live near as is possible, considering the nature of the work to be done.

FOREIGN TECHNICAL EDUCATION.

In a previous number of the *Builder* (March 20), a brief *resumé* was given of the principal facilities that exist in France for qualifying young men for the different trades and occupations which they propose to enter, or for improvement in those which they have entered. Numerous as these different schools are in France, they are excelled in number by those of her neighbour, Germany, and particularly those in which the actual working man has an interest. It is proposed in the present paper to continue the subject, and describe the main institutions in Germany, passing over the schools of primary instruction, and the middle-class schools (*burger schulen*), which are of too general a nature to be technical. Forming a link between these and the technical schools proper are the *Fortbildung schulen*, or Improvement schools for young workmen already engaged in their trades. It is, in fact, an effort to continue the education given in the elementary and middle-class schools to workmen who have left them; and while the teaching is directed towards somewhat general subjects, such as writing, geometry, book-keeping, there is, in addition, a distinctly technical instruction, in the shape of physics, chemistry, technology, and the elements of manufactures. There are three of these schools in Berlin, the classes being usually held on Sundays, from eight a.m. till one p.m., as being the most convenient time to attract the young workmen who are engaged during the week. The average number of pupils is about 1,200. The trade schools, or *Gewerbe Schulen*, are in-

tended for a rather higher class, the object being to train commercial assistants, masters, and foremen for manufactories, and to prepare the candidates for the higher grades of the polytechnic institutes. These schools, in which the course of education extends over two years, at a very moderate cost to the student, are some twenty-five in number, and are found in the chief industrial centres, such as Cologne, Elberfeld, Crefeld, Königsberg, Aix-la-Chapelle, Coblentz, Iserlohn, Saarbrück, Frankfort, Bochum, &c. As the expenses for maintaining them are very considerable, they are subsidised, partly by the Government and partly by the town funds. Each provincial trade school consists of two classes, the lower (occupying the first year) intended for theoretical instruction and drawing; the upper, for specific teaching of whatever trade the individual may choose to adopt. Attached to each trade school is an improvement school for workmen, for the purpose of giving instruction to apprentices and workmen on week-day evenings and Sundays, and thus they obtain the advantage of the teaching of the professors, who are bound to attend, and are paid according to the extra time occupied. The ordinary teaching staff of each trade-school consists of three professors,—one for mechanics, mathematics, and technology; the second for chemistry, natural science, and physics; and the third for drawing, modelling, and construction. On an average, some 700 young men are turned out every year, which is perhaps not a very large number in proportion to that of the schools. Of specific technical schools, Berlin possesses an Academy of Architecture, an Academy of Mines, an Industrial Drawing School, and a Navigation School. The first-named trains architects and engineers for the service of the State and the different towns, as well as for private practice, the instruction extending over two years. If the student is a candidate for the certificate of private architect, he must produce a three years' practical acquaintance with one of the trades of mason, stonecutter, or carpenter; and if he wishes to qualify for public work, he must have gone through a course of study in a "practical" school, must have passed a year in the practice of building, and have a knowledge of levelling, measuring, and drawing. The school has a staff of twenty-three professors and six assistants; but their teaching services are apparently not rated very high, being only from 3s. to 6s. per hour's lesson. Between 400 and 500 pupils attend these classes every year, and the plan of study may interest the readers of the *Builder*. In the first year are taught the elements of construction, drawing, and exercises; projections, applicable to stonecutting, vaults, &c.; determination of shadows; perspective; ancient architecture; plans of simple buildings; rural constructions; knowledge of materials and prices; drawing of ornaments; hydraulic constructions, roads, and railways; pure and applied mathematics; mechanics; taking of plans; natural science; elements of physics, and chemistry. In the second year are courses of construction, architecture, warming and ventilating; projects, ornaments, and decorations; free-hand drawing; land surveying; telegraphy, and higher mathematics. At the end of these courses, which, it must be admitted, are tolerably comprehensive, the students are admitted to examination for a diploma, the candidate for the title of *Baumeister*, or public architect, having to show proof that he has worked for two years under the direction of an architect, and to prepare the project of an architectural construction. A sort of travelling fellowship is also attached to this school, by which the author of the best project receives about 80*l*. for travelling abroad.

The Academy of Mines, or *Berg Akademie*, was founded in 1861, and gives special technical instruction to three classes of pupils. The pupil of the first-class, that of the new-comers, is called *élève des mines*; the second is the class of those students who have had two years' practical working, and are called auditors of mines (*référendaires des mines*); the third and highest is that of assessors of mines, for which nobody can present himself until after two years more passed in administrative works under a chief engineer. Excellent laboratories are attached to this institution, with special facilities for analysis by both dry and humid process. The Institute Drawing School (*Meister Zeichnen Schule*) is in some degree affiliated to, although it has a separate existence from, the Polytechnic Institution; and its purpose is to form designs and compositions for textile fabrics in silk, woollen, or cotton, for printing tissues, and also for producing patterns for paperhangings. In addition to drawing and designing, the theory and practice of weaving are also taught; as also instruction given in patterns for oilcloth, upholstering fabrics, carpets, embroidery, and lace. There are also weaving-schools at Elberfeld, Mulheim, and Crefeld, all Prussian textile towns, though the schools at Elberfeld are adapted for the cotton and woollen manufactures, and at Crefeld for velvet. At all these, teaching is given in the fundamental principles of weaving, the knowledge of properties of textile substances, the elements of the composition and decomposition of plain and figured tissues, the arrangement of new patterns, and the art of graduating colours for all sorts of fabrics. Each pupil keeps a book in which are collected the patterns of different kinds of tissues which he has to analyse and decompose, calculating their elements and reproducing the perforations of the cards by sketches. Upwards of forty-two looms are placed at the disposal of the students, who have to work at them to practise both the preliminary preparations and actual weaving. There is one more technical educational establishment at Berlin, which will pretty well close the list as far as Prussia is concerned, and that is, the Royal Trade Institution, or Polytechnic, to which two-thirds of the pupils are admitted gratuitously. The course, which is for three years, includes instruction for mechanics, chemists, metallurgists, and shipbuilders, together with every facility for laboratory study, and a fine library of 100,000 volumes. Those pupils who intend to become shipbuilders must spend six months in a ship-yard, while mechanics, after completing their three years' classes, may remain for another year studying in the workshops of the Institution. There is a celebrated mining and metallurgical school at Clausthal, and six navigation schools, respectively situated at Memel, Dantzic, Pillau, Stralsund, and Grabow, near Stettin. On a future occasion, we will briefly glance at the technical education offered throughout the remainder of Germany and Austria. Prussia, at all events, seems to do her part very thoroughly in this direction.

WEST HARTLEPOOL DOCKS.

THESE new docks which are near completion by the North Eastern Railway Company, give every indication of materially changing the conditions of the port for the better, and of affecting in very considerable degree the trade of the north-east coast. Alike in extent of cost and in method of construction, they are worthy of taking rank amongst the most notable of the works which have been carried out by the owning company, one of the four great railway companies of the kingdom; whilst they will become valuable feeders to the trade of the district and of the port. Hartlepool, it may be said, is an old port, but it is one which sank very materially in importance during the last century, but which, since the birth of the railway system, has obtained a new and vigorous life. As the success of the first railway became an established fact, others were projected, and one of those was the old Hartlepool Company, which in 1832 obtained an Act of Parliament authorising the construction of a dock, which, with the inner harbour, included 60 acres, the estimated expense of the works being 209,000*l*. On the 6th of July, 1835, the Hartlepool Railway was opened for traffic, and on the 7th of November, 1840, the Victoria Dock was also opened, and by it an immense impetus was given to the trade of Hartlepool, more especially that of coal shipment. Gradually the whole town felt the impulse, and what had been a decaying fishing-port became one of the most prosperous little places in Durham. But there were not facilities for the whole of the trade, and from the desire to grant these facilities sprang the town of West Hartlepool, which is a modern creation, in the township of Stranton, two miles or so west of Hartlepool. The new town has derived its trade first from its docks. The Act giving powers to construct the first dock was obtained in 1845, and the dock itself was opened in June, 1847, it being devoted to purposes of coal shipment. A second dock was found needful for merchandise, and this was constructed on a larger area, and opened in 1852; whilst a third was opened in June, 1856. Since then there have been several subsidiary works,—timber-docks, and ponds for timber floating purposes,—created, and the growth of the port as a place for the shipment of general merchandise and coal, and for the importation of grain, timber, and general goods, has been very rapid indeed; whilst a town of large population has grown with even trans-Atlantic rapidity, and with such facilities for shipment it is not to be wondered at that there is a corresponding development of enterprise in manufactures, the timber, iron, shipbuilding, chemical, and other trades having been commenced and carried on with spirit.

Of recent years the want of more, and especially of deeper, dock accommodation, has impressed itself upon the North-Eastern Railway Company, who acquired the property of the old Hartlepool Company several years ago, and who, fifteen years since, also bought up the large works of the West Hartlepool Harbour and Railway Company, which previously had swallowed the Stockton and Hartlepool Railway and the unfortunate Clarence Railway. Five years ago this conviction of need was so fully felt that it was decided to add another dock,—one of eight acres,—to the existing system; but before this was carried out the plan was largely extended. Between the old Victoria Dock and the newer system to the west there was a tidal estuary called the Slake, of which the North-Eastern Railway Company became the possessors, and in the western part of which they formed large timber ponds. It was decided to utilise this estuary by making deep-water docks and connecting locks, and thus to unite the two dock systems at the Hartlepools, and to increase the depth of the whole. This is the work which has now been brought to successful completion in all its chief features. From the second of the West Hartlepool docks there is a tidal basin which admits to what had been intended to be the eight-acre dock, but which has been considerably increased. From this there is entrance to one of larger dimensions, which is connected by a long tidal lock with the inner harbour of the Hartlepool Dock system. The new docks extend over 34 acres, and with the diversion of the railway (which was needed and carried out at a cost of 98,000*l*.) and with the warehouses still to be completed, the cost is, in round figures, 500,000*l*. This vast cost will in a degree indicate the magnitude of the works; but, it may be added that the quay wallage needful has been 6,000 ft. long; that over 1,250,000 cubic yards of material have been excavated; and that the placing of 17,000 yards of concrete has been necessary. Rarely have works been carried out in so massive a manner. The old highway between the two towns was cut through by the docks, and a new road was made which is carried over the timber-ponds by an extensive and costly bridge formed of iron girders, sustained by columns resting on screw-piles forced nearly 40 ft. into the earth. The length of bridge is 241ft., in four spans,—two of 62 ft. and two of 58 ft. 6 in. Three massive swing bridges convey the roadway over entrances to the respective docks, the bridges being of iron, of which over 700 tons have been used in the construction of each. The gates are double, to save waste of water, and as a precaution against accident; they are hung on a walling of solid granite blocks, of which material also the dock-cills are formed. The dock-gates themselves are formed of iron plates, opened and shut by magnificent hydraulic machinery from the works of Sir W. Armstrong & Co., of Newcastle-on-Tyne. The quay walling is massive in character, the masonry at the dock-entrance being, at the upper surface, not less than 33 ft. 6 in. wide, and thickening downwards. Stone from quarries in Cleveland, at Spennymoor, and other parts has been used; and every other part of the works has been carried out in a manner correspondingly substantial and complete.

By these works the dock accommodation at the Hartlepools has been raised to 176½ acres, including the area set apart for the profitable use of timber-ponds. In addition, there is a yet greater gain than that of enlarged accommodation. When West Hartlepool Harbour was formed it was believed that it gave a sufficient depth of water with 22 ft.; but as the position of the port has grown, and as the trade has gravitated towards steam vessels and those of deeper draught, that depth has been found to be insufficient. The new works are therefore so planned as to take advantage of a natural channel of deep water at Hartlepool, where a mean depth of 27 ft. of water is obtained. The lock which admits into the upper reach of this channel is 31 ft. deep, and the new main dock gives not less than 27 ft. 6 in. depth of water. The

great result of these immense works will be best stated when it is added that laden line steamers will, when they are completed, be enabled to leave at almost any state of the tide. Already the effects are being seen in the fact that there is now a line of steamers commenced from the port to Boston, United States, and the provision and cattle importing trades seem likely in an early future to become as important at West Hartlepool as have the timber and grain importing trades now. It is needful to state that the large dockworks, to which we have above referred, are carried out from the plans of Mr. T. E. Harrison, the chief engineer of the North Eastern Railway; that Mr. C. Harrison has been the resident engineer; the contractor is Mr. Walter Scott, whose resident engineer has been Mr. J. T. Middleton. Sufficient progress has now been effected with the works to enable the month of June to be locally looked to for the formal opening, and efforts are now being made to obtain the presence of some member of the Royal Family at the ceremony.

THE PROPOSED CATHEDRAL OF ST. MARY, TRURO.

As our readers are probably aware, H. R. H. the Duke of Cornwall lays the foundation-stone of this new cathedral on the 20th inst. An interesting question arises as to when the foundation-stone in England of a cathedral was last laid. Of course, as St. Paul's was only rebuilt after the Great Fire, and Manchester was originally a parish church, they do not come under the same category. A large number of old houses have been cleared away from the north side of the present church, and a fine open space now presents itself for future operations. Mr. James Babb,—Mr. Pearson's clerk of works,—is actively superintending the progress of the works, and, under him, Messrs. Julian & Sons, builders, of Truro, are erecting platforms around the site for the accommodation of 5,000 spectators. These seats are to be let out at a guinea and half-a-guinea a seat; the proceeds,—no trifle, if all the sittings are thus utilised,—will go to the building fund. The two foundation-stones will be granite. What will the cathedral itself be built of? This, at present, seems an open question. Perhaps, after granite, the best materials that Cornwall affords are Pentewan and Polyphant stones. The former looks almost like granite, the latter is of a slaty colour. Ham-hill stone is a popular West Country (Somerset) material, and its name has been mentioned in association with Truro. But, ere such a stone is brought into the county, the resources of Cornwall,—and they are exceptionally great,—should be well considered.

The corporation of Truro intend to spend some 2,000*l.* on the decorations of their city for the event, and Mr. Silvanus Trevail, architect, Truro, is to design them.

ST. OSWALD'S SCHOOL, ELLESMERE.

THIS school, the first stone of which was laid by Lord and Lady Brownlow in August, 1879, is being erected on a site of great natural beauty about a mile from the town of Ellesmere, in Shropshire. It will form one of the three great schools to be built in the midland counties on the system of Canon Woodard's schools at Lancing, Hurst, and Ardingly, in Sussex. St. Chad's school at Denstone, near Uttoxeter, for 400 boys, the second of the midland schools, is now in full operation, and was illustrated in the *Builder*, June 29, 1879. The yearly sum paid by a boarder at Denstone is 34 guineas, while at Ellesmere, which is intended for the lower middle class, it is proposed to fix the cost at 20*l.* The main arrangements of the buildings are as follows:—The principal entrance is in the eastern quadrangle, in the centre of the cross building which joins the north and south wings. This cross building contains on the ground-floor the provost's and chaplain's rooms, porter's dwelling, secretary's offices, and visitors' parlour; boys' dormitories occupy the upper stories, and on each floor a corridor communicates with the north and south wings. The chapel and ante-chapel will form the north side of the east quadrangle. The south wing, three stories high, contains the boys' library and museum, music-rooms, and dormitories; and in the centre of it is a block of rooms for the masters; at the eastern end of this building, and at right angles to it, is the head-master's house, with its dormitories and day-room. Passing through the principal doorway, the western quadrangle is entered, whence there is a magnificent view over a wide expanse of country. On the north side of this quadrangle stands the Hall, approached from a vestibule, which forms also the entrance to the ante-chapel. The buttery, kitchens, laundry, and other offices, together with the servants' dormitories, are grouped on the northern side of the hall, and form a block of buildings of considerable extent; here also are placed the engine-house and furnace-rooms.

The south wing contains the master's library and common room on the ground floor, and dormitories, &c., as above; the house of the second master and his dormitories stand at the western end of this wing.

The great schoolroom is placed between the houses of the head and second masters, continuing the line of the central cross building. The foundations of a considerable portion of the buildings and the lower story of the offices have been already executed by Messrs. Bowdler, of Shrewsbury, and it is intended that the superstructure shall be proceeded with at once.

The school buildings when completed will accommodate 500 boys.

The style adopted is an extremely simple form of Gothic; the materials are local red bricks, with dressings of Cefn stone; and the roofs are to be covered with Welsh slates.

The total sum proposed to be expended is about 50,000*l.*

The buildings are being carried out from the designs of the college architects, Messrs. Carpenter & Ingelow, of Carlton-chambers, Regent-street, Mr. J. Garland acting as clerk of works.

The drawing we reproduce is in the Architectural-room at the Royal Academy, and was referred to in our notice last week.

THE CHAPTER-HOUSE, NETLEY ABBEY.

SOME time since the *Builder* devoted an article (August 23, 1879) to a description of the remains of the conventual buildings at Netley, which are more preserved than in most cases in England, and which, as far as we can ascertain, are not illustrated by any adequate published drawings. The lithograph drawing which will be found accompanying this number is an attempt to convey the effect of the chapter-house remains as at present seen, with the masses of ivy and other vegetation overhanging the walls and arches between which the silent Cistercian brotherhood used to meet centuries back to consider the affairs of their order. Canvas and colour would be required, indeed, to give an adequate idea of the picturesque effect of this nook of half-ruined Gothic building under a bright sunlight, but the present illustration may help to call attention to the interest of these remains, the more formal illustration of which by measured drawings and plans would be a task well worth undertaking.

One or two remarks on the peculiarities of this portion of the building may not be out of place. The view is taken, of course, from the cloister court, on which, as in most Cistercian abbeys, the chapter-house opened directly,* through arches generally open to the air. The chapter-house is square on plan, and does not, as usual, project beyond the main line of the east wall of the conventual buildings; this divergence from the usual oblong plan being no doubt to be attributed to the fact that Netley was a small foundation, and the plan regulated by the amount of accommodation required. It was vaulted in nine compartments, as will be seen by the springers on the walls; of the four central piers which carried the vaulting no trace is seen above the present ground-level, though their foundations may still remain beneath the surface. The centre archway of the three was the entrance, the other two bays having been partially filled up with a dwarf wall, part of which remains on the right; the floor was apparently below the level of the cloister, as far as can be judged in the present state of the ground, and below that of the adjoining fratry or day-room; the reason for this was probably to get sufficient height for a dignified chapter-house without interfering with the levels of the floor above. The arch mouldings of these three arches are of the finest and most effective style of Early English moulding,—a section of them is given in one corner of the drawing, which is not, however, cymagraphed, and must not be relied on as absolutely correct, but is so as far as careful sketching by the eye, aided by measurements of the groups of mouldings with a foot-rule, can make it so. The main piers were decorated, as will be seen, with marble shafts, nearly all of which are gone, the caps only remaining. There is one peculiarity in the three arches as at present existing, that the centre one has a sub-order of mouldings which the side ones want, the appearance being as if there had been an intentional emphasising of the centre arch; the soffits of the others show no trace of anything having been broken away, yet on the respond at the extreme right hand is clearly visible a cap projecting beyond the present order of the arch, and carrying nothing, from which it is evident that something is gone. The method of finishing the arch-mould at the soffit, with a flat and a roll at each side, is, of course, common in Transitional work, but not so much so in fully-developed Early English; and the conclusion seems to be that the sub-order of the side arches, having no bond with the courses of voussoirs above it, was broken away, for some reason, by early spoliators, who did not think it worth while to demolish the centre one. It is odd that it should have been done with so much regularity in the side arches, and that the archivolt should appear so completely finished as it does, nevertheless; but there must be some reason for the projecting cap on the right-hand respond. The other respond is much more ruined, and all trace of any such cap on it is gone.

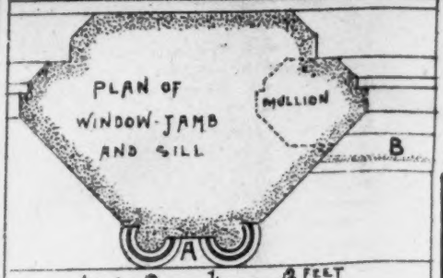
Not only was the doorway of the chapter-house open to the cloister, but there was no glass in the windows opposite, no trace of window grooves or bars. There was probably some kind of lattice hung in the window opening in winter. A curious evidence is found of the open-air construction of the room in the channel below the window-sill, shown at B in the section of the sill given in the corner of the drawing, evidently intended to carry off the rainwater which found its way under the lattice. Another point which the architectural reader will notice is the treatment of the plan of the piers between the windows internally, where the wall face, as shown at A, is advanced about 2 in. beyond the main line of the wall at the angle of the embrasure, so as to bind together, as it were, the two shafts which rise from the plinth, and combine them more completely in appearance with the masonry construction; a small point which is highly characteristic of the minute and severe logic brought to bear upon the building art in those times. The architectural design of these windows is most impressive, although they are not, of course, on a very large scale, on account of its extreme simplicity and largeness of style, and the effect given by the deep splays and the effectively moulded scoynson arch. The splays of the side windows, it may be observed, are wider and more obtuse in angle than those of the centre one. On the jamb of this window, about 8 ft. or 9 ft. from the present ground level, are traces of a band of colour, leading to the conclusion that the wall was diapered or otherwise decorated up to that height, and stopped by a horizontal band. It is worth notice that, although the arch mouldings are so fine and deeply cut, the springers show no indications of anything but a plain chamfer for the decoration of the vaulting-ribs.

The drawing, it may be mentioned, is by Mr. H. H. Statham, from a careful sketch made on the spot.

* In our article before referred to, we called attention to the mis-statement in the Rev. Mackenzie Walcott's "Monasticon," in which this apartment is spoken of as "the *vestibule* to the chapter-house." The fact that a supposed authority on these matters could give such a description, with the range of windows on the east of the apartment clearly before him, and not a trace of a door leading further or of any further wall on the exterior, is significant as to the extent of reliance to be placed on the descriptions of clerical amateurs.

Long Ditton.—The new parish church of St. Mary's, Long Ditton, Surrey, has been consecrated by the Bishop of Rochester. The old church having become too small for the increased population, it was resolved to erect the present building, from a design by Mr. Street, on ground contiguous to the old churchyard. The whole cost will be about 6,400*l.*, which will include fittings, warming apparatus, and lighting. The completion of the work is mainly due to the churchwardens, Messrs. J. S. Hill and J. Bates, the latter of whom erected the chancel at his own cost, and to the liberal contributions of the principal inhabitants, aided by a grant of 200*l.* from the Incorporated Church Building Society, and 100*l.* from the Rochester Diocesan Society.

RBBEY



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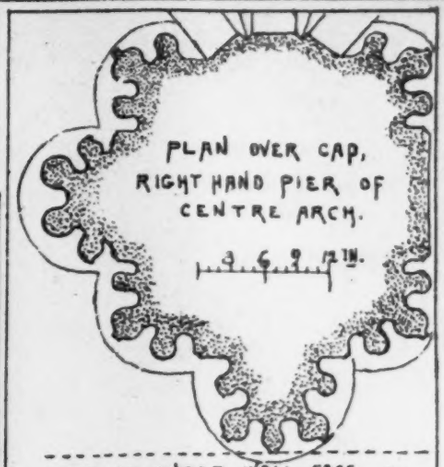

LINE OF OUTER WALL-FACE

ARCH-MOULD, INNER
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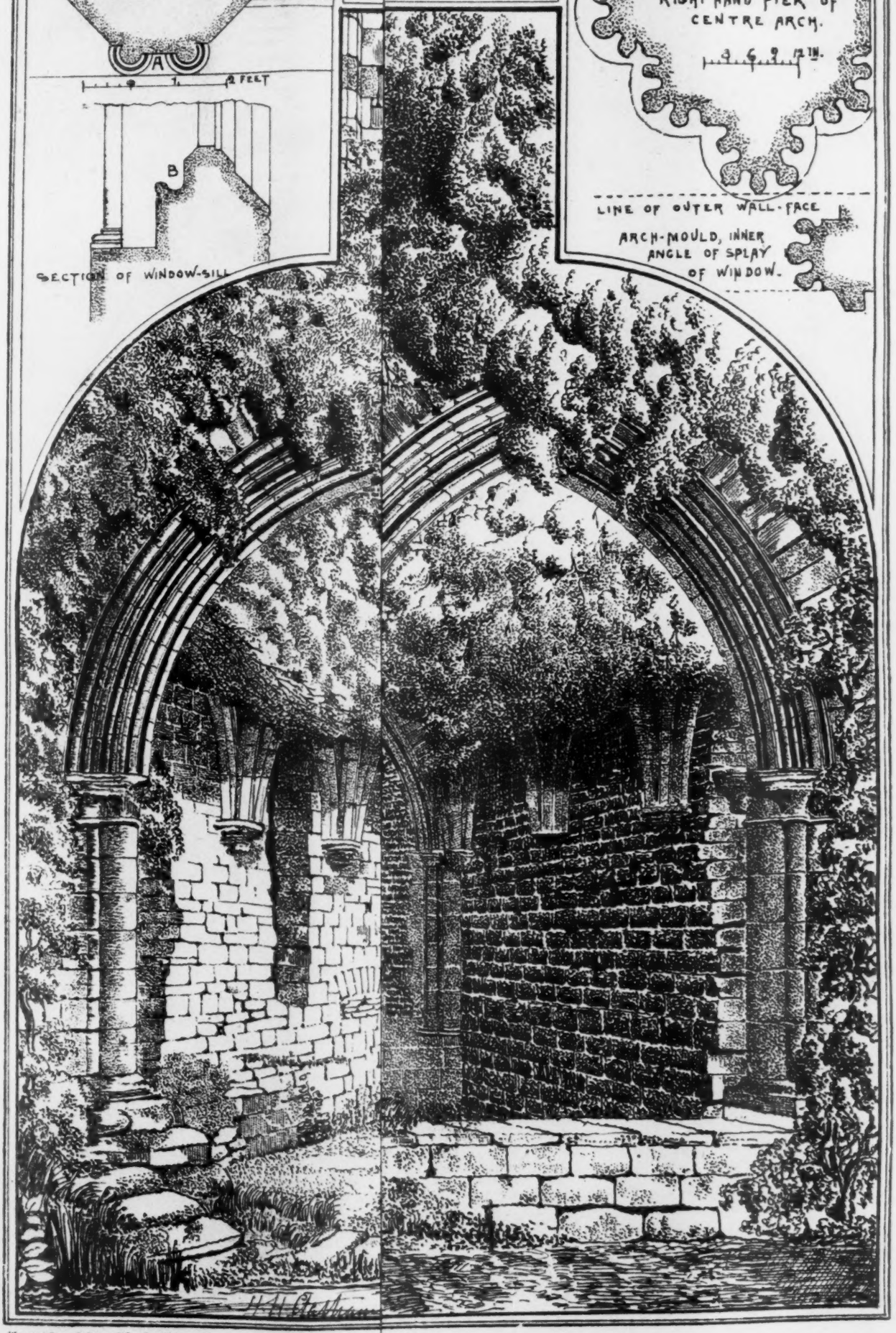

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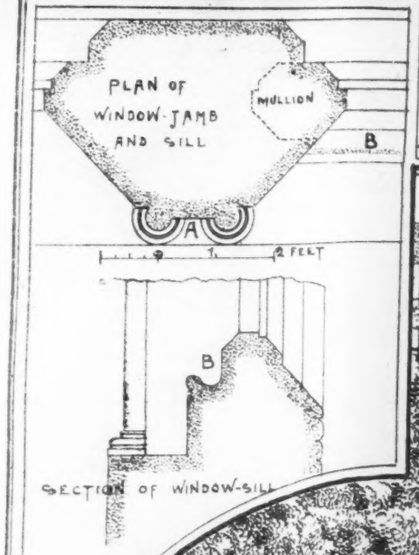
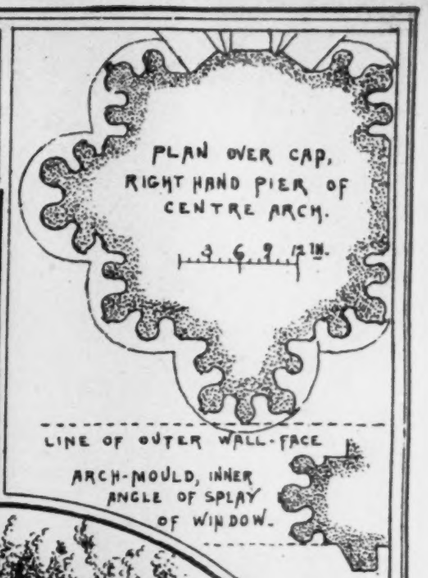
REMAINS OF THE CHAPTER-HOUSE NETLEY ABBEY





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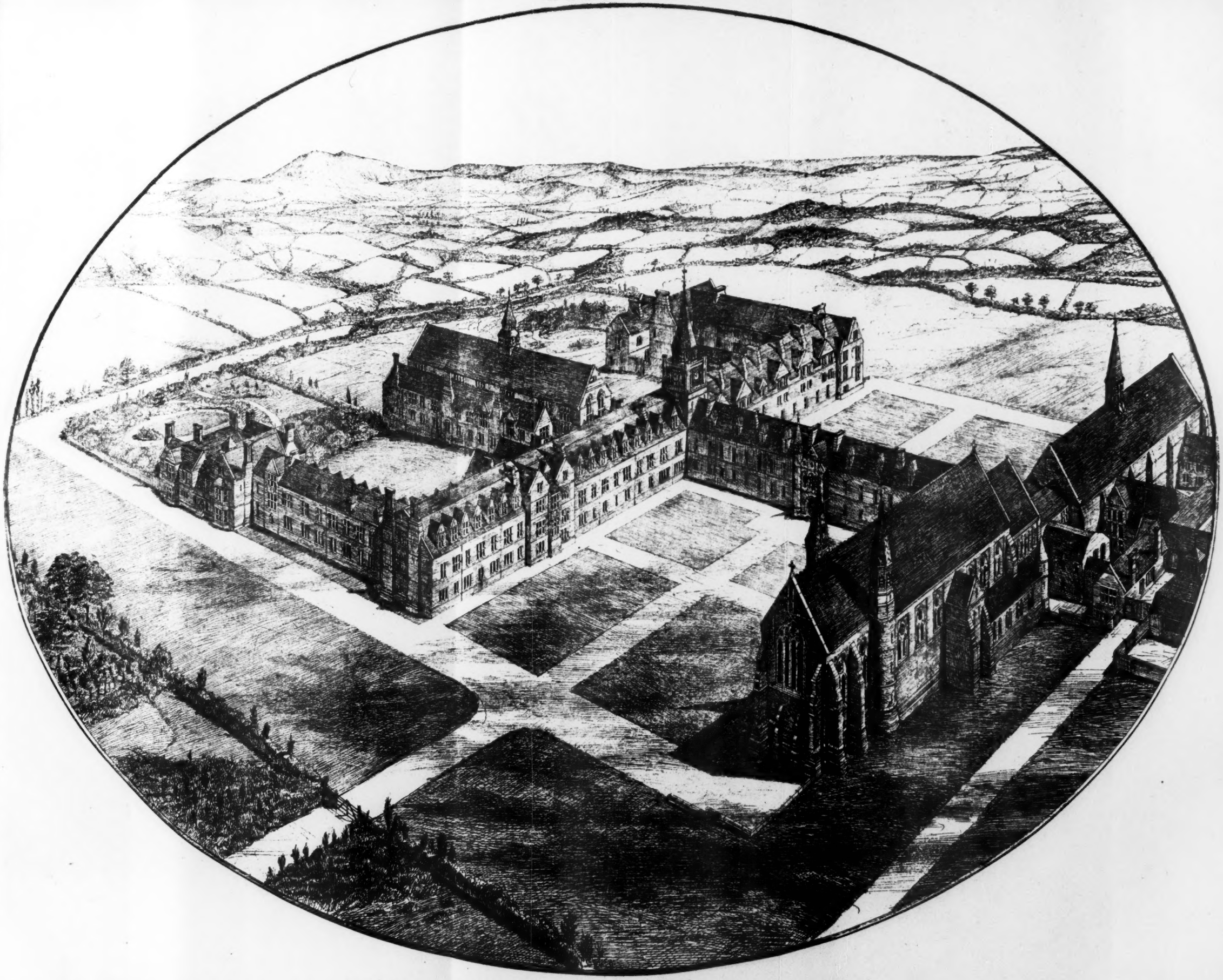

ST. OSWALD'S SCHOOL, ELLESMERE, SHROPSHIRE.—Messrs. Carpenter & Ingelow, Architects.

IN THE CHOIR OF THE CATHEDRAL, SARAGOSSA.

THE CHOIR LINING OF SARAGOSSA CATHEDRAL.

THE metropolitan church of the Saviour, or La Seo, of Saragossa, is one of the most sumptuous temples of Spain. A church here was celebrated at the time of the Goths. Being used as a mosque during Arab supremacy, it was reconsecrated, after the capture of the city by Alfonso I., surnamed the Warrior, by Bishop Pedro de Librana on the 6th of January, 1119. Beneath its high arches numerous councils have been held, and the solemn coronations of the Arragonian kings have taken place.

It is not our intention to describe this magnificent temple, which was declared metropolitan by Pope John XXII. in 1318. It was the equal of the Cathedral of the Pillar in 1675, and constitutes as a whole a veritable museum. We merely supply here a few particulars of our illustration, which represents the principal portion of the later work with which the choir is lined.

The florid style displayed in the outer walls of the choir contrasts strongly with the pointed arches and work of the building itself. Above the basement of marble rises the work of the sculptor Tuledilla, of Tarazona. It includes statues of the martyrs St. Lawrence and St. Vincent; four delicate reliefs, which represent episodes of the martyrdoms of the two deacons; twelve balustrade-columns and a cornice, with bizarre sculptural work, crowned by half-shells and groups of angels; also a tabernacle, of six columns, which incloses a crucifix. As we have remarked already, only a portion of the work is shown in our illustration. It is said to have been commenced in the sixteenth century, during the time of Archbishop Dalmacio Mar.

EDINBURGH.

THE transformation of the West End Theatre into a Theological Hall for the United Presbyterians has now been effected, after having been in the hands of the workmen for a period of about two years. As regards the exterior, the task was a very simple one. The outward aspect of the building was severe rather than gay, and had no features special to a temple of the drama. All that has been done to the principal façade is the filling in of the large semi-circular-headed windows with tracery, which gives somewhat of an ecclesiastical effect to the building. As regards the interior, however, the task was a difficult one, and the conversion of, it from gay to grave is thorough. Not a vestige of what once was now remains, and those who have now to enter upon the scene can do so without a feature to distract their attention from the parts they have to perform. Since autumn, the portion of the building devoted to the theological classes has been in use, and this month the annual meeting of the Synod will be held in the great hall. This hall measures 109 ft. by 70 ft., and the ceiling is 36 ft. from the floor. The ceiling is of plaster, and is divided by heavy beams into panels, in some of which circular lights are formed, and a series of arched windows light the sides. The central area of the house is devoted to the use of the members of the Synod, to the number of 700. At the west end is situated a raised platform, having in front a balustrade of polished teak, and in the centre of the platform is placed the moderator's seat, with a canopy of carved teak, the seats at each side being devoted to ex-moderators and distinguished visitors. In the galleries which surround the hall on three sides, and in the space beneath them, which is separated from the central area by a low wooden partition, provision is made for an audience of 1,150 persons. Both area and galleries are surrounded by corridors, which afford ample means for entrance and exit, there being sixteen doors leading into the area of the hall and four into the galleries. These corridors are well lighted, and are surrounded by a series of rooms devoted to different purposes. Coils of india-rubber tubing are hung about in the corridors, which may tend to cool the zeal of timid visitors afraid of fire. Should such, however, arise, the means of escape seem ample, and the staircases are formed of concrete, which is presumably a fireproof material. The floor of the hall is raised about 14 ft. above the old pit level, and is supported by iron pillars. The space beneath is formed into a dining-hall; and as, from its position, it receives no light from without, it is lighted by gas.

The operations in connexion with the proposed new chancel and porch for St. John's Church have been suspended, the objections to their being erected over a portion of the ground occupied as a burial-place having, apparently, not yet been overcome.

At Canonmills, a new Board School has been erected, which will accommodate about 800 pupils. It stands at the west side of Canonmills-road, and has a frontage of 130 ft. Mr. Wilson, the architect of the Board, while adhering to the peculiar adaptation of Gothic employed by him in the schools at Lothian-road and St. Leonard's, has used less variety in the form of the windows, which are more uniform in character than in the two former examples. This is decidedly a step in the right direction, and the building, though plain, is substantial and business-like, without being fussy and pretentious. The cost of the building, including fittings, will be about 7,000*l.*, or about 8*l.* 15*s.* per pupil. It will be ready for occupation by the beginning of next session.

A bequest of 50,000*l.* has been left to the university by the late Dr. Vans Dunlop, of this city. 30,000*l.* of that amount are to be paid over to the university authorities at once, and 20,000*l.* are subject to the life-rent of a relative of the deceased. The will provides that 3,000*l.* shall be applied to the general fund of the university, and the remainder in founding scholarships of 100*l.* each, tenable for three years.

The Deacon's Court of New South Leith have acquired a piece of ground for a church at the corner of Easter-road and Lochend-road. The ground measures 127 ft. by 86 ft., and the annual feu-duty is 54*l.* 4*s.* For some years past building operations have been actively prosecuted between Easter-road and Leith-walk. The buildings erected consist principally of dwellings for the working classes, but little has been done towards providing church accommodation for the increased population. The site acquired is a convenient one, and affords scope for architectural effect.

ST. ALBAN'S ABBEY.

THE FACULTY FOR THE WEST FRONT.

THE Chancellor of the Diocese of St. Alban's, Mr. T. E. P. Robertson, D.C.L., has given his judgment for the faculty applied for by Sir E. Beckett, and condemned the opponents in costs. Archdeacon Grant, Earl Cowper, and Mr. John Evans were the opponents, and their counsel argued that a faculty could not properly be granted until sufficient drawings had been brought in, an estimate of the cost furnished, and a bond given that the work agreed upon should be carried out. The question of *locus standi* was argued at considerable length, but that affects very slightly the archæological part of the case, in which we are mainly interested. A little of the argument on the main point is, however, highly instructive. Mr. Jeune, the counsel for the opposition said:—"In the citation which was issued it was stated that Sir Edmund was willing to restore the western front, except the three porches. There was no reference in the document to plans and specifications. Certainly a sketch was put in which was wholly insufficient for the purpose, not being drawn by a professional architect. He then read an affidavit made by Mr. Christian, architect, in support of the argument. On such a drawing as that deposited, Mr. Christian said, he could not give an opinion, and he thought it would be undesirable to grant a faculty till there were proper plans deposited. There were two other affidavits, one being from Mr. J. L. Pearson, R.A., confirming the opinions expressed by Mr. Christian. It came to this, that the Chancellor was asked to grant the faculty absolutely in the dark."

The Chancellor.—All I can say is that if plans and specifications were presented to me, you might as well show me the Chinese alphabet; it would be just as intelligible.

Mr. Jeune.—Plans, &c., may not be intelligible, but there are such things as professional advisers.

Sir E. Beckett.—And they will swear on either side. You get half the Institute of Architects on one side, and I will get half on the other.

Mr. Jeune.—It is not as if Sir Edmund said he was going to employ a man like the late Sir Gilbert Scott, and they were told what was going to be done.

The Chancellor.—There is his son.

Mr. Jeune.—But what guarantee is there that the son will be employed? As far as is known, Sir Edmund will employ no one. A Cathedral ought not to be handed over to be treated at the caprice of a single individual. The invariable practice of diocesan chancellors ought not to be departed from, and therefore in this case plans and specifications should be given.

Sir E. Beckett replied. He said he knew why plans were pressed for, because there were plenty of architects who would criticise them, and then leave him either to hire a certain number of other architects to swear they were all right, or take the chance of having the application rejected. The architects would criticise the plans for nothing, as it was well known that the Institute had taken a part in this matter. Therefore he was not surprised to find that his learned friend had got the affidavits he produced. But this was not a question of giving plans and estimates. He wanted to restore the building, and spend a sum of money,—20,000*l.* people had been pleased to say,—and everybody but Archdeacon Grant was extremely willing that he should spend it. As to plans, he would remind the court that the Faculty Committee did not deposit any, nor did they give a bond. The plan of what he proposed to do he showed to the rector, and to people in St. Alban's, last September. The parish was in favour of the work being done, and the rector and the churchwardens, after opposing, now approved of the proposal. But one man was not in favour of the restoration, though everybody else was. Plans he would not deposit. Did he consent to do so he would have to be fool enough to pay Mr. Scott some 300*l.* in order to make them, and then perhaps he might not get the faculty. The drawing produced was, he contended, sufficient to show the general features of what was proposed to be done. The question really came to this. The building was stated, in the previous faculty, to be in a ruinous condition. There was no doubt about it, and was he to send down to St. Alban's, and say "Discharge every one"? If he did, then he had a right to say that the result would be that the building would fall down; and on these ruins he should put a board or something more permanent of its kind, with these words on it,—"*Hanc ædem prostravit Antonius Grant.*"

Mr. Jeune asked the Court not to abdicate its functions at the bidding of an individual, however distinguished and generous.

It is possible that at some future time, when all the cathedrals and other old buildings have been treated under faculties duly issued after inquiry and payment of the regular fees, that a suggestion may be made in favour of appointing Chancellors who have some knowledge about buildings, drawings, and architecture.

Notice of appeal from the judgment of the Chancellor has been given; but the judgment is sufficiently interesting to be given now nearly *in extenso*:—

"This is an application from Sir E. Beckett, bart., for a faculty to enable him to restore at his sole cost, the west front. It is desirable to state how this application has arisen. At the era of the Reformation, the abbey, or a part thereof, was made the parish church, and as such continues to this day. In the year 1875 the Legislature assigned the abbey church, on its being intended to become the episcopal see of St. Alban's, to a bishop as the cathedral church, 'subject to the rights of the incumbent of such church,' without any further limitation. Bishop Claughton, intending to resign the See of Rochester, and to become the first Bishop of St. Alban's, as he had the option, issued a faculty in 1877 to certain persons, eleven in number, selected by himself, to be a permanent committee, amongst whom were Sir Edmund Beckett, Archdeacon Grant, John Evans, esq., and the rector and churchwardens of St. Alban's, authorising them 'to restore, repair, and refit the Abbey Church.' On an appeal to the public, money was subscribed, and a sum collected for carrying out the necessary works. The sum raised as yet is, however, insufficient to pay for the works actually contracted for, and in consequence they have been suspended. There is at present a sum of 3,000*l.* for which the faculty committee are liable.

The petitioner has most generously and magnificently offered to restore, at a cost probably of 20,000*l.*, the west front of the cathedral; and though in the first instance nine or ten persons appeared to oppose the grant of a faculty to him for that purpose, the opposition is now confined to three, namely, Archdeacon Grant, Lord Cowper, and Mr. Evans. The interest of the two latter is denied. Lord Cowper and Mr. Evans assert that they have an interest on the ground that they are large landed proprietors in the diocese, and that they contributed to the general fund, now exhausted, for the repairs. These circumstances, however, do not, in my opinion, constitute an interest in law. It was suggested in argument that the cathedral is a parish church for the inhabitants of the diocese, and an interest is thus constituted. That was so in remote times. I have, however, never understood that this did confer a legal interest so as to enable any one to institute a civil suit in respect of the cathedral. The inhabitants of the diocese were never compelled to contribute to the sustentation of the fabric. To constitute a legal interest Lord Cowper and Mr. Evans ought to show that they have prospectively a pecuniary interest, however small, however distant, to give them a *locus standi*. This they have not in

the present instance. The Archdeacon, as a parishioner, is entitled to the rights of any other parishioner in that part of the cathedral which constitutes the parish church, and also to visit the same officially—to nothing more; as, on the 12th of December, 1878, he withdrew from the executive committee. He has not attempted to show that his interest, such as it is, will be affected in any way by the proposed restoration of the west front.

The opposition to the grant of the faculty asked for is based on the asserted want of 'plans, designs, specifications, and estimates by a professional architect.' This is certainly in keeping with an unseemly interference contained in a letter addressed to me at the very outset of this cause by the Institute of British Architects, dated December 5th, 1879, and it is fully echoed by three affidavits from the same quarter. It is impossible, in my opinion, in such a singular case as this, to furnish specifications, working plans, and estimates until the outer coating of the west front is taken down, in order to ascertain the extent of the decay. To have done this in the first instance the building would have been exposed during the past winter to further mischief. This so-called 'sketch' was exhibited for many weeks at the office of the clerk of the works, and was intended to show what the general effect would be. It is not said, in any one of the three affidavits brought in by the opponents, that it is out of keeping with the rest of the cathedral. The sin shall not rest at my door for allowing any part of the cathedral to fall down, by insisting on a bond being given for the completion of the work intended to be executed at the cost of the petitioner. The case seems to come to this, that out of a population of about 9,000 in St. Alban's, —I take my numbers from the last census tables,—one parishioner only is found to oppose the grant of a faculty, and that individual is the Archdeacon. I feel no hesitation, in this very remarkable case, in pronouncing for the faculty asked for, and for condemning the opponents in costs."

The Society for the Protection of Ancient Buildings, who are considering the appeal, must prosecute it by the 13th of May, or the faculty will be issued to Sir E. Beckett.

"MILD STEEL" AND ITS APPLICATION TO BUILDING PURPOSES.*

Having now concluded this brief outline of the present position of the steel manufacture, so far as it concerns such steel as is at all commonly used for constructive purposes, I must next say something more as to the characteristics of the material itself. I may class these conveniently enough under four heads, viz.:—1. Uniformity and trustworthiness; 2. Workability; 3. Strength; and 4. Rigidity. That so-called steel of many different qualities could be made much stronger than iron has never been denied, but for many years there stood in the way of its extended use the belief,—unfortunately at one time too well founded,—that it could not be trusted. Great difficulties were, indeed, experienced for a long time in ensuring uniformity of quality, and the name of the best firm in Sheffield would have been no guarantee that in any large delivery there would not be great variations, and too probably a good many failures. And further, if the material were uniform, it was believed to require,—perhaps it did at one time require very specially,—careful handling while being worked, specially trained workmen to handle it, and altogether a gingerly kind of treatment which could not practically be obtained in ordinary circumstances. Fortunately there were not a few manufacturers who saw that much of this was at least great exaggeration, if not pure fancy, and who were firmly enough convinced of the value of the new material to go on using it through evil report and good. They staked much upon their belief, however, and were compelled for their own sakes to insist most strenuously upon the steel-makers leaving nothing undone which should ensure the uniform character of their material. The steel-makers were nothing behindhand in the matter, and have probably done more in ten years to perfect their material than had ever before been done, in such a case, in half a century. Mr. Barnaby, in a paper which he read before the Institute of Naval Architects in 1875, puts the question definitely thus:—

"What are our prospects of obtaining a material which we can use without such delicate manipulation and so much fear and trembling? . . . . . We want a perfectly coherent and definitely-carburised bloom or ingot, of which the rolls have only to alter the form, in order to make plates with qualities as regular and precise as those of copper and gun-metal, and we look to the manufacturers for it."

I believe it may now be said with certainty that we have not been looking to the manufacturers in vain, and of this it is easy for me to give you evidence. In the first place, it happens that within the last few weeks I have been testing, in my laboratory at University College, ordinary commercial samples of all the three materials mentioned by Mr. Barnaby, and the following are the results: three similar pieces of each material being tested at a time. The difference between the highest and the lowest tenacities of three bars of ordinary (cast) copper amounted to 29·5 per cent. of the strength of the highest, the same difference with ordinary gun-metal being 21·6 per cent., and with hard gun-metal 12·4 per cent. With five sets of steel samples, on the other hand, of different sizes, cut from ordinary boiler-plates, the differences were 1·5 per cent., 0·7 per cent., 7·1 per cent., 4·8 per cent., and 2·9 per cent. respectively. Taking the mean in each case as a rough comparison, we have 21·2 per cent., against 3·4 per cent., and even taking the highest and the lowest of the fifteen steel specimens (although they were of very different sizes) the difference is only 9·6 per cent. It is hardly worth while now discussing how far the complaints as to the non-uniformity of the steel, and the somewhat extraordinary failures which occurred with it every now and then, were well founded; there was probably quite enough truth in them to justify a good deal of hesitation in using steel. But the tables are now fairly turned, and it is hardly too much to say that there is no iron in the market that can hold its own for uniformity and freedom from failure in working against the steel now supplied by our leading manufacturers, or that can stand anything like equally well the same strictness and frequency in testing. Mr. William Denny, of Dumbarton, whose firm has been building ships very largely in steel since 1876, says that in one small steamer they are now building of iron, they have had more failures than in their whole consumption of about 7,000 tons of steel. He says, also, that in the case of a number of light draught steamers of iron which he at one time sent out to India in pieces, they were invariably annoyed, more or less, by corners of plates coming off, angle-irons cracking, and so on, during shipment and transshipment. Last year he built and shipped in the same way six paddle steamers entirely of steel, without losing by breakages anything whatever. Another well-known mechanical engineer, who uses both steel and iron on a very large scale, tells me that he hardly ever has to return less than 15 per cent. of his best Yorkshire iron, on account of defects in working, while he absolutely never has any failure with steel. It would be easy to multiply testimony of this kind, but it is probably unnecessary to do so.

Two matters in connexion with the working of steel have demanded, and received, special attention from engineers, but the importance of both is reduced to a minimum in the cases of most importance to the members of this Institute. These two points are:—1. The effect of punching upon the material, and 2, the necessity for annealing it after working. Our present experience makes it possible to say very distinctly that mild steel, which has not more than about 30 tons per square inch tenacity, is not more injured by punching than ordinary wrought iron, and is less injured in the case of thin plates, say up to half-inch thick. With material of this quality, therefore, no special allowance has to be made for weakening by the punching of rivet-holes beyond what is made in dealing with wrought iron. With the harder qualities of steel, such as are often used for rails, having a tenacity of about 40 tons per square inch, and containing about 0·4 per cent. of carbon, there is no doubt a proportionately greater loss due to punching, and, what is still more important, the local strains induced by the operation of punching have the effect, sometimes, of originating a fracture, which, when once started in this way, may readily extend itself. This difficulty can be got over in either of three ways, viz., (1) by annealing the plate after punching, (2) by drilling the holes instead of punching them at all, or (3) by punching the holes smaller than the intended size, and then riming them out to the full diameter. The first method has the special disadvantage that, as we shall see immediately, it inevitably reduces the tenacity of the steel. The second method is no doubt a complete remedy, although a somewhat expensive one in many cases. The third method is also a complete remedy, and is now very largely used, the injury done by punching being confined,—as is shown by a very great number of experiments,—to a thin zone of metal, perhaps 1-16 in. thick, round the punched hole. If this strained zone be removed, the metal resumes what may be called its molecular equilibrium, and the remaining metal is as strong as it would be were the hole drilled entirely,—as strong, that is, as an equal area of the solid plate.

The effect of annealing is to reduce very materially the tenacity of mild steel. When possible, therefore, one would prefer to avoid the necessity for using the operation. The reduction of strength varies, of course, with the hardness of the material, but it may be from 10 to 20 per cent. with such qualities as are quite commonly in use. In the case, therefore, where the material is weakened by punching it is clearly better to rime out the punched holes in the way just mentioned than to punch them simply and then anneal the steal. The latter method certainly destroys the local strain and makes the material safe, but only at the expense of a very considerable reduction from its proper and original strength. In cases where angles have to be bent or plates flanged, it was for a long time found or thought to be necessary to anneal the material after working it. Whether it is owing to the more uniform nature of the material with which we are now supplied, or to the greater familiarity of our workmen with its manipulation, or to both causes combined, most engineers now find that their forgings are quite as trustworthy before or after annealing, and are dispensing with the process entirely for the milder qualities of steel.

And now as to the *strength* of such steel as is available for constructive purposes Out of the great number of qualities of mild steel which are made, we may indicate two classes as being of special importance. The first of these is the very mild steel which is accepted by the Admiralty, Lloyd's, and the Liverpool Underwriters for ship-building purposes. The Admiralty limits for tenacity are 26 to 30 tons per square inch; Lloyd's limits are a ton higher, and the Liverpool Underwriters' a ton higher still, or 28 to 32 tons per square inch. All three, therefore, admit steel which lies between 28 and 30 tons per square inch, the first two requiring also the ultimate extension of the piece before fracture to be not less than 20 per cent. in an 8-in. length. Such steel requires practically no annealing, and, as has been mentioned, is not more injured by punching than wrought-iron, and in many cases less so. The regulations mentioned all refer to steel for ship-building purposes or for boilers, where the metal has to undergo a great deal of heating and working, and the non-admission of stronger material is due to the fact that it is more difficult to work and less certain after it is worked.

The second class of steel having special importance for constructive purposes is that which has a tenacity of about 10 tons per square inch more than the former, or about 40 tons per square inch. It is, of course, much harder and considerably less ductile, and much less suitable for places where much work had to be done on it. But it can be obtained just as uniform in quality as the milder material, and its superior tenacity gives it great advantages where it can be used substantially in the form in which it leaves the rolling-mill, *i.e.*, without punching or bending. It will extend about 10 or 12 per cent. in 10 in. before fracture.

I have placed upon the table several samples of each of these qualities of steel, and upon each is marked its limit of elasticity, ultimate extension, and modulus of elasticity, as well as its breaking load. These samples have been tested in the machine in my laboratory at University College. None of them have been made specially for testing, and they may be taken to represent fairly the material which is in the market in the two classes of which I have spoken. To compare with them I have placed beside them some samples of common iron, such as is used in ship-building and bridge work, and marked upon them also the particulars just mentioned.

The requirements of the architect in the way of material are much simpler and more easily satisfied than those of the shipbuilder or engineer. The ironwork used in buildings—in such buildings, that is, as are not pieces of engineering rather than works of architecture—is in general either in the form of rolled joists or of riveted girders, consisting of plates and joists or plates and angles. The joists are used practically as they come from the mill,—cut to lengths, but not generally punched, any holes there may be in them being commonly drilled. This is a case, therefore, in which the question is not complicated by any considerations as to difficulties of working, and so forth, for the material has no working to undergo. There seems no reason

* Paper by Mr. Alex. B. W. Kennedy, M.Inst.C.E., Professor of Engineering in University College, London. Read before the Royal Institute of British Architects on the 19th ult. (See p. 552, *ante*.)

why the harder steel—36 to 40 tons tenacity—should not here, in many cases, take the place of iron. Its use, strength for strength, would probably be considerably cheaper than that of iron. There has hitherto been very little demand for rolled joists in steel, and there is some difference of opinion on the part of those most competent to judge as to the relative difficulty of rolling them in steel and in iron. At the present moment, however, one, if not more, of our largest firms is rolling steel joists at very much the same price as that at which firms of equal standing are rolling them in iron, a price perhaps 30 per cent. in excess of what is paid for Belgian joists. The difference of strength in favour of the steel over the latter would probably be about 80 per cent.; over English (iron) joists, perhaps 60 per cent. In either case there would be a large balance of economy in favour of the stronger material.

The case of riveted girders is somewhat different. There we have to deal with punched plates and angles, and not uncommonly with some bending and other working. As a mere matter of fact I do not doubt that riveted girders of the harder steel, in the making of which all precautions had been entirely omitted, would not contain nearly such serious defects as are often found and thought nothing of in wrought-iron girders, although doubtless a great deal more would be heard about them. At present, however, and until the class of workmen concerned becomes more accustomed to handling the material, its use requires a good deal of judgment, and in many cases the milder and less strong steel is to be preferred. For this material "Lloyd's Register" allows a reduction of scantlings in all parts of ships, built under their regulations, of 25 per cent., and there is no doubt whatever that this does not err on the side of rashness. Compared with such material as I have frequently seen in girders for buildings, a reduction of 30 to 35 per cent. would be fully justified. Whether or not this would pay would of course depend on the relative prices of steel and iron angles and plates. At present the former are about 40 or 50 per cent. in excess of the latter, but the ratio varies from time to time.

The much greater ductility of mild steel than of iron has sometimes led to erroneous notions as to the relative *rigidity* of the two materials for structural purposes, which it is worth while mentioning. The modulus of elasticity of a material is inversely proportional to the amount which a bar of given size extends under a given load, and this modulus is somewhat *larger* for mild steel than for iron. The extension, therefore, up to the limit of elasticity, is *smaller* in the steel than in the iron. The actual working extension of the steel will, therefore, be less than that of a similar bar of iron. These extensions are, of course, very small, and only accurately measurable by very special apparatus; but are, nevertheless, the only extensions which ought to occur, or do occur, in practice. That a piece of mild steel 10 in. long will extend, before it absolutely breaks, twice as much as a similar piece of iron, is a matter of interest only as showing the extreme ductility of the metal, and not in any way as a fact having practical application to design, or to conditions under which we ever wish to place any of our structures. The difference between iron and such steel as we are speaking of, so far as rigidity is concerned, may be summed up briefly by saying that, up to the load at which the iron begins to be sensibly stretched or bent, the corresponding distortion of the steel is *less* than that of the iron; that with further additions of load the steel remains elastic, while the iron is greatly and permanently strained; and, lastly, that at greater loads still, and long after the iron has broken, the steel continues its deflection or extension, which, before its breaking point is reached, greatly exceeds the utmost which the iron could reach without fracture. In several cases this fact has been the saving of steel ships in cases where iron ones must have gone to the bottom; as, for instance, in the recent instance of the *Rotomahana*, which struck on a rock last New Year's-day, and about which her owners say that "there is little doubt that had she been of iron such a rent would have been made in her that she would have filled in a few minutes. A number of frames were set back by the force of the blow, the bulkhead was bulged, and the plate was corrugated, and yet there did not appear one crack anywhere." The battered plate was taken out, placed in a furnace and heated, and then hammered back into shape, and found uninjured, all the rivet-holes coming in again; and the same was the case with the frames. Nothing whatever had to be renewed. The material used in this case was the 30-ton steel of which I have already spoken.

I have already spoken incidentally of the tests enforced by the Registry societies and others in connexion with the steel they permit to be used where work is under their control. No doubt in some cases the testing is irksome, and causes inconvenient delays; but its advantages probably outweigh small troubles of this kind; and it may safely be said that had it not been for these tests, and the rigid way in which they have been enforced, we should still be very far from having the splendid material which is now ready to our hands. I cannot, therefore, suggest that steel should be used without testing as yet, and the question arises how best this ought to be done. The tests commonly enforced are of three kinds:—(1) the tenacity of the steel must lie between certain definite limits; (2) the samples tested must have a minimum percentage of extension, in a specified length, before fracture; and (3) sample strips, heated to a low cherry red and cooled in water at 82° Fahr., must stand doubling round a curve whose radius is not more than one-and-a-half time the thickness of the strip. The last-mentioned test is that known as the "temper test."

All the tests are made upon sample strips of (commonly) from 0·5 to 1·0 square inch in sectional area, cut from the plate, bar, or angle, as the case may be, the strips being generally of the same thickness throughout, having from 8″ to 10″ in the centre parallel, and being wide at the ends where held in the machine. The tests are made by preference at the maker's yard, in presence of the inspector, doubtful or special cases being sent to some independent testing machine. In the case of large orders not less than two per cent. of the number of plates, &c., has to be tested in this way; but not a few of our chief steel-makers test for their own satisfaction, both chemically and mechanically, samples from every blow or from every run.

Granting that it is advisable to continue the carrying out of tests, and if so, also, that these tests should be realities and not mere forms, it is certainly advisable that some method of this kind should be substituted for the present plan of testing girders whole. At present it is frequently specified that a certain per-centage of the rolled joists or other girders about a building should be tested up to loads equivalent to those given in Shaw's Tables (which correspond to a maximum stress of 6 tons per square inch in the material), and should return to their original forms without permanent set, and this deflection test is the only one carried out. When it is remembered that it is not easy to measure a small permanent deflection, say one-tenth of an inch, with certainty, on a 20-ft. joist, with such means as are commonly used in the yard, it will be readily understood that this test cannot be very rigidly enforced under ordinary circumstances. But even if it could be, it is not a satisfactory one, for it is one which will be passed by almost any material,—very common iron equally well with excellent steel,—and affords no clue whatever, as a test ought surely to do, to the properties of the material used. It would, I venture to think, be very much more satisfactory, and probably not a whit more expensive or troublesome, if the tests specified were made more like those adopted by the Registry Societies. The temper test, however, could be hardly ever necessary for architects' purposes, and might be altogether omitted. It would be sufficient to specify that one out of (say) every ten joints or angles should be supplied 18 in. more than the ordered length, the extra piece cut off, and two strips cut from it (one from the web and one from the flange in the case of the joist), tested for tenacity and extension. The limits fixed might be, according to circumstances, either 28 to 32 tons tenacity per square inch, and 20 per cent. extension in 10 in., or 38 to 42 tons tenacity and 12 per cent. extension.

There is just one other matter to which I may allude. There is one direction in which, I am sanguine, the next few years will see very great strides made, and that is in the use of mild steel castings, direct from the furnace. The difficulties of obtaining sound steel castings, especially with thin metal or with much coring, have been very great, but many of them have already been overcome, and others have been fast yielding to the determined attacks of the manufacturers. Even now it is possible to obtain, at a price far below that of heavy forgings, steel castings having nearly double their strength, castings which are, of course, as malleable and weldable as the rolled metal of which we have been speaking. In engineers' and shipbuilders' work it does not require great prescience to foretell for those castings the greatest importance; for use in buildings they will probably have fewer applications. It is not unlikely, however, that they might often replace cast-iron in cantilevers and brackets with enormous advantage as to strength and trustworthiness, and not a little as to appearance, on account of the very much lighter sections in which they might be used.

This paper has been written with the object of placing before the members of this Institute, as far as it has been in my power to do so, an outline of the principal methods by which mild steel is at present prepared, and the qualities which are to be found in this material. I have endeavoured to confine myself to a statement of facts, not entering upon any discussion as to whether or not,—having this material ready to hand,—architects would be wise to follow engineers in their liberal use of it. Among the members of my own profession it has met with the most cordial welcome, and is already used both in structures and machines continually and on the largest scale. I am not without hope that before long we may see it taking its place in buildings as freely as in engineering structures, and with as beneficial results to all concerned.

THE MYSTERIES OF COLOUR.

UNDER this title some notices have appeared in this journal (March 27th and April 3rd and 17th) of interesting lectures by Mr. Spottiswoode, P.R.S., and Professor Tyndall, in England; and by Professor Donders in Holland, and M. Charles Blanc in France.

The first two commented on the remarkable speculations of the famous Goethe. His well-known work on the theory of colour, of which an elegant translation was published by the late Sir Charles Eastlake, R.A., excited immense controversy in Germany at the time of its first appearance, and so far as it sought to overthrow the Newtonian analysis of light, was refuted again and again in the country of its birth. Its inherent interest makes it still the subject of discourse by learned men; for to those who understand the real nature of light and colour, even the mistakes of the poet-philosopher are very instructive and attractive, although they present no difficulty at all. How strange it seems that one who had such a keen perception and enjoyment of natural phenomena should contend so earnestly for such an incoherent muddle of a theory! It has often struck me that though such expressions as "Light seen through a turbid medium," or "Darkness seen through a dim medium," present no rational clue to the cause of redness or blueness, they are wonderfully appropriate to Goethe's own theory, and to many other theories which have been advanced and maintained from time to time, about light and colour. Such theories are either natural truths, dulled and perverted by the turbid medium of minds ignorant of science, or else they are absolute falsities presented by the medium of an imagination only dimly illuminated, yet able to invest them with an appearance of light, not their own.

The last two of the lecturers referred to show in some degree that not among lovers of art in England only, but on the Continent also, these dim and turbid views do still prevail, and cause a good deal of needless mystery where clear views of the simple truth of nature would be of infinite service. How long the mists creep about in the valleys, and cling to the mountain tops, after the light has appeared that should disperse them! For it cannot be denied that daylight has now for a long time been seen, even on this mysterious subject.

In England, what was propounded by Thomas Young, three-quarters of a century ago, was long since subjected to experimental proof by the late lamented James Clerk Maxwell, who showed that all possible colours can be produced by mixtures of those prismatic rays which are of the best red, green, and blue (that is of the violet blue) colour; and that this is not true of the mixtures of any other rays. In Germany the same thing has been shown independently by another eminent physicist, J. J. Müller; and

Professor Helmholtz, admittedly one of the first authorities of the age, has in his lectures, delivered in 1868, on "The Recent Progress in the Theory of Vision," of which an English translation was published in 1873, most clearly unfolded the doctrine that all differences of hue depend upon "combinations in different proportions" of these three primary colours. In those lectures, after explaining thereby various phenomena of the colour-sensations, Helmholtz says,—"The theory of colours, with all those marvellous and complicated relations, was a riddle which Goethe in vain attempted to solve; nor were we physicists and physiologists more successful. I include myself in the number, for I long toiled at the task without getting any nearer my object, until I at last discovered that a wonderfully simple solution had been discovered at the beginning of this century, and had been in print ever since for any one to read who chose. This solution was found and published by the same Thomas Young who first showed the right method of arriving at the interpretation of Egyptian hieroglyphics. He was one of the most acute men who ever lived, but had the misfortune to be too far in advance of his contemporaries. They looked on him with astonishment, but could not follow his bold speculations; and thus a mass of his most important thoughts remained buried and forgotten in the Transactions of the Royal Society, until a later generation by slow degrees arrived at the rediscovery of his discoveries, and came to appreciate the force of his arguments and the accuracy of his conclusions."

I myself, as I mentioned in one of my first attempts to elucidate this subject in the pages of the *Builder* (see vol. for 1868, p. 643), was first enlightened by Dr. Young, and so useful and beautiful did that light seem to me, that I vainly supposed its value would be quickly recognised by artists in colour of every kind. But the "later generation" is even slower than Helmholtz thought it had been twelve years ago, and has not yet arrived at the understanding of this "wonderfully simple solution" of the theory of colours, namely, that the eye is capable of three, and only three, simple sensations of colour, which are excited in varying degrees by all the different prismatic rays included in what we call *light*. They do not yet see that all the science of the harmony of colour, all real understanding of the nature and causes of our instinctive perception of beauty in colour, all right judgment as to the true relations of colour, must depend upon the knowledge of these simple sensations, and of their combinations.

You have created a good title,—The Mysteries of Colour! I should like to add a few queries on what appear to me some of the most strange of these mysteries at the present time.

1. Why should it be supposed that yellow is to be ranked as a "primitive" or "incomposible" colour, as Professor Donders and M. Charles Blanc call it? Nothing is easier than to show by analysis with the prism that any brilliant yellow substance reflects both the red and the green rays of the spectrum. Nothing, again, is easier than to produce the very best yellow that can be seen by throwing together all the prismatic rays from the beginning of the red to the end of the green. Nothing in the relations of colours is more obvious to the eye than the affinity between yellow and red on the one hand, and between yellow and green on the other, and the perfect contrast between yellow and the true or violet blue. How, then, is yellow a primitive, incomposible, simple, elementary, or primary colour? And what is the mysterious meaning of those terms when applied to a colour which so evidently results from the sensations of red and green being excited at once in the same part of the retina?

2. Why should any of the prismatic colours (whether Newton's seven, or M. Charles Blanc's six) be called primitive in preference to any of the rest, excepting always those three which by composition in various proportions can produce the rest, but which cannot be imitated (in their fulness and hue) by any compositions of the rest?

3. Why should the names of colours continue to be used, as they are in many technical treatises and lectures, in such a very loose way, without any reference to a common and invariable standard? Or, in other words, why should assertions be constantly repeated about colours, which under the ordinary acceptation of the colours named are quite contrary to fact? For instance, M. Charles Blanc says that violet is a compound of red and blue, whereas, the prismatic violet merely differs in hue from the brighter blue in being more free from admixture with green. Again, he says, following the loose nomenclature of Chevreuil and others, that red and green are complementary; whereas, the simplest experiments (either by the colour-top or the slip of polished glass) show that those colours, in their ordinary acceptation, do not neutralise each other at all; for the red of vermilion makes a shade of orange with grass green; a shade of yellow with emerald green or viridian, but with the sea-green of verdigris (which most people would as soon call blue as green) it makes a perfectly neutral grey. And why should the mystery arising from the loose way in which the ambiguous popular names of colours are used be made still greater by adding absolutely incorrect and misleading illustrations of complementary colours, as may be seen in the diagrams referred to in the little "Manual of Colour, with a Catechism, prepared for the use of Students in the Department of Science and Art," in which, if I mistake not, those students are still examined?

4. What is the meaning of the doctrine of "chromatic equivalents," or that "five of red, three of yellow, eight of blue," neutralise each other? Supposing that any three colours which can resonably be called red, yellow, blue, will ever neutralise each other (which cannot be unless pink may be called red, and verdigris blue), why should those numbers be taken as measures of their relative intensities? How can the intensity of one colour be compared with that of another? If three colours, in a certain intensity of each, neutralise each other to make white, why should not that particular intensity of each in which they so neutralise each other be regarded as equal, so that one of each may suffice, instead of five of one, three of another, and eight of another?

When mysteries like these are taught as established truths, without any attempt at explanation or proof, whilst plain physical and physiological facts are persistently ignored, it is one more mystery to me what can be the good of such teaching. William Benson.

THE TAY BRIDGE AT THE SOCIETY OF ENGINEERS.

At a meeting of this society, held on Monday evening last, in the Society's Hall, Victoria-street, Westminster, Mr. Joseph Bernays, president, in the chair, a paper was read by Mr. Graham Smith on "The Design and Reconstruction of the Tay Bridge." After detailing the particulars of the design and construction, the author stated that 34 lb. of wind distributed over the side of the structure and train would be more than sufficient to overturn it, inasmuch as the calculations were based upon conditions which would give a maximum result which could not be reached in practice. The bolting down, through being improperly performed, only added to the stability of the bridge to an extent represented by 1·3 lb. of side pressure per superficial foot. Without a train upon the bridge, calculations on the same basis as before gave 51 lb. as the amount of wind pressure which the bridge would be capable of withstanding. This being so, it was natural to suppose that the portion with the train upon it was first blown over, and that the remainder was pulled down by the falling ironwork, assisted by the wind, and that it may have fallen in any one of many ways, about which it would be waste of time to speculate. He said the form of pier adopted was about the worst that could be imagined with a limited base, and that the bracing was badly proportioned and faulty in design. The portions of the bridge at present standing were little more stable than those which had fallen, notwithstanding that they were lower and smaller spans. The 145-ft. spans, without a train upon them, might resist a pressure of 76 lb., but with a train it would require but 37 lb., or only 3 lb. more than the higher spans of 245 ft. He thought the piers were quite incapable of resisting a side pressure of any amount, and that, therefore, if it was decided to reinstate the bridge as a single line, it would be necessary to rebuild it from the bed of the river upwards, so that the 120,000*l.* which had been set aside, although possibly sufficient to restore the bridge to its original form, was quite inadequate to make it a safe single-line bridge. The proposal to build a new bridge by the side of the old bridge, he said, would be a somewhat hazardous undertaking, inasmuch as any inequality of settlement in the old and new foundations would render the bracing useless, and might induce strains on the piers the amount of which it would be impossible to determine. He therefore proposed to build new piers in line with the old piers, of sufficient strength to resist side pressures, and place a girder from the old to the new pier, on which could be placed the main girders carrying the railway. In this way a double-line bridge might be constructed, in which unbounded confidence might be placed, for a sum not greatly exceeding that which would be required to reinstate the present structure in a manner such that it might be safely worked as a single-line bridge.

The discussion on the paper was commenced (in the absence of the reporters, who were requested to withdraw, lest they should give publicity to any statements which it might not be expedient to publish pending the official inquiry), and adjourned to the next meeting.

THE MONEY INVESTED IN HOUSES.

A few years ago we gave some particulars of the amounts annually spent and invested in the construction of houses in Great Britain, which were so startling that some incredulity was manifested on the part of those who had not inquired. A recent number of the *Statist* gives some particulars of the same kind. We have not compared them with our own figures, but they may be usefully quoted as affording data for calculations.

"According to the Inland Revenue accounts, the gross *annual* value of houses in Great Britain was 104,726,372*l.* in 1877-78. The number was 5,475,564. In Mr. Giffen's paper* on the accumulations of capital in the United Kingdom, the *capital* value of houses was estimated, on the basis of multiplying their annual value by fifteen years' purchase, at about—

1,420,000,000*l.*	in the year 1875	
and 1,031,000,000*l.*	„	„ 1865
Increase 389,000,000		

being an increase of 39 millions annually, or nearly 4 per cent. every year on the lower total of 1865. Since then, as we judge from the Inland Revenue returns, there has been a continued growth at a still more rapid rate, the number of houses in Great Britain (without Ireland) having increased from 5,261,694 in 1875-76, to 5,389,258 the next year; and to 5,475,564 in 1877-78, as already stated.

We may, therefore, safely conclude that, if houses augmented in capital value at an average rate of 39 millions yearly between 1865 and 1875, the rate of growth has lately reached and exceeded 50 millions sterling. All of the present increment is not owing to the new dwellings which are continually crowding round the great towns, but most of it is attributable to new houses, and only a part to the factitious value given to houses by their accidental advantages of position. The increased capital put into houses has evidently been enormous, and the figures take cognizance of only the outside shell."

The Coffee Music Hall Company.—A meeting to further the interests of the above, and explanatory of its present position, was held on the 29th ult. in the drawing-room of Miss L. B. Courtenay, 34, Brompton-square, at which were present, amongst others, the Rev. W. Page Roberts in the chair, Rev. H. V. Le Bas, Dr. Norman Kerr, Dr. Farquharson, Mr. Edgecombe, Mr. Palgrave Simpson, Mr. Corney Grain, and Mr. Bullock (manager). Dr. Norman Kerr said the demand for recreation and amusement among the working classes was enormous, and the supply must be given, and they were willing and ready to assist by giving an evening's rational amusement at a large, bright, cheerful music-hall, with good (not classical nor too high-flown) music, with good tea and coffee, instead of the too often adulterated intoxicant, with the same licence for smoking, the same fun, and the same price as the ordinary music-hall. He (Dr. Kerr) would guarantee a good dividend on money invested in shares, and stated that 2,500*l.* had already been paid up, and they had a large and suitable building in their eye. At the conclusion of the meeting several persons signed their names for shares.

* Statistical Society's Journal, March, 1878.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the annual general meeting of this Institute, held on Monday evening last,

The President (Mr. John Whichcord) alluded to the decease, on the 25th ult., of Mr. Robert Hesketh, Fellow, in the following terms:—

Mr. Hesketh was elected a Fellow of the Institute in the year 1849, and for many years attended our meetings, until he changed his residence from Wimpole-street to Red-hill. He was articled to Mr. Hardwick, having previously studied under Pugin; and when his articles had expired in 1839 he joined Sir Charles Fellowes in a tour to Rome, Smyrna, and other parts of Asia Minor. Returning at the close of 1840, he commenced practice. The works executed under his superintendence are numerous, and he held valuable appointments,—amongst others the surveyorship to the Goldsmith's Company, with which he was connected until his death. Mr. Hesketh took a prominent part in the framing of the Metropolitan Building Act; he was consulted by the Government, and gave evidence on the subject before a Committee of the House of Commons. As a mathematician he was well known and justly reputed, while in the science and execution of music he was a genial and happy companion, who will long be regretted by a large circle of friends.*

Remarks were also made by Professor Kerr and Mr. Edmund Woodthorpe on the loss to the profession by Mr. Hesketh's death.

The Report of the Council on the state of the property and affairs of the Institute having been taken as read, the President moved that "the Report be received and adopted." The motion having been seconded by Professor Lewis, F.S.A., a discussion ensued, in which Mr. Wyatt Papworth, Professor Kerr, Messrs. Joseph Jennings, William White, Charles Barry, James Edmeston, Henry Dawson, T. Chatfeild Clarke, and other gentlemen, took part. An amendment, moved by Professor Kerr and seconded by Mr. Edmund Woodthorpe, that the words "and adopted" be omitted, having been put from the chair, was negatived; and the original motion was carried, with one dissentient.

The following office-bearers for the year terminating on the first Monday in May, 1881, were then elected, viz.:—

President.—Mr. John Whichcord, F.S.A.

Vice-Presidents.—Professor T. Hayter Lewis, F.S.A., Mr. Horace Jones, and Mr. Ewan Christian.

Ordinary Members of Council.—Messrs. John Macvicar Anderson, A. W. Blomfield, M.A., David Brandon, F.S.A., Arthur Cates, Joseph Clarke, F.S.A., Henry Currey, John Gibson, Octavius Hansard, John Honeyman (Glasgow), Edward I'Anson, F.G.S., James Thomas Knowles, J. L. Pearson, A.R.A., F.S.A., George Vulliamy, Alfred Waterhouse, A.R.A., and Thomas Worthington (Manchester).

Honorary Secretary.—Thomas Henry Wyatt, F.S.A., Past President.

Secretary.—Mr. William Henry White.

Treasurer.—Sir Walter R. Farquhar, bart., Hon. Associate.

Solicitor.—Mr. Frederic Ouvry, F.S.A., Hon. Fellow.

Auditors.—Mr. T. Roger Smith, Fellow, and Mr. John Hebb, Associate.

THE PROPOSED NEW THEATRE IN BEAUFORT-BUILDINGS AND THE STRAND BOARD OF WORKS.

THE plans for the new theatre in Beaufort-buildings, which is about to be erected for Mr. D'Oyley Carte, are meeting with a certain degree of opposition from the Strand Board of Works, on the ground that the entrances and exits are inadequate, and it is further urged that the ordinary traffic in the Strand will be impeded. The subject came under the notice of the Board at their last meeting, Mr. Jones drawing attention to the fact that the plans which had been presented to the Metropolitan Board of Works provided for new means of access; but Mr. Jones urged that so far as the west and south sides were concerned the approaches were quite inadequate; and he was also afraid that the proposals would cause interruption to the great traffic in the Strand. The question, therefore, became one of very great importance to the district, and he thought that the attention of the Metropolitan Board of Works, and any other authority who might have control over the erection of the building, ought to be drawn to the matter. The Board resolved that a letter embodying the objections mentioned be forwarded to the Metropolitan Board of Works, and the Lord Chamberlain.

Liverpool Art Club.—Under the auspices of this club, an extensive exhibition of water-colour drawings by artists born in the first half of the present century was inaugurated on the 26th ult.

* Mr. Hesketh was also surveyor to the London Insurance Company. He was sixty-three years of age at the time of his decease, which occurred at his residence, The Mount, Earlswood. By his death, one of the District Surveyorships of the metropolis becomes vacant.

ARCHITECTURAL ASSOCIATION.

IN the discussion which followed the reading of Mr. Ingress Bell's paper on "'Unrest' in Architecture," printed in our last,

The President (Mr. S. Flint Clarkson) said that the paper had ably dealt with some aspects of modern architecture which many in that room had recognised and regretted, although the matter had not been, perhaps, so strongly insisted upon, or so definitely treated of, as by Mr. Bell. As a matter of fact, indeed, the observation of the defect dealt with in the paper had, he believed, led to a change in tone of architectural design at the present day, in the direction of breadth, which would have a most important effect on the architecture of the next ten years. The undercurrent moved for some time before anybody recognised its movement. Mr. Bell had ably put before the meeting the principles which should guide the members in the production of all good and noble design. The difficulties in dealing satisfactorily with town houses were oddly illustrated by architectural criticism. Some twenty years ago it was always the custom to insist particularly that each story of a town house should necessarily be a story complete in itself. In other words, the use of a separate order of pilasters or columns for each story was a satisfactory method of design. But the grouping of the stories together, as was the custom during the earlier years of this century, with a large order which should run through two or three stories, was ridiculed as being contrary to all architectural practice. The tendency now seen in actual work was causing architects and critics to modify their views on that point, and it was noticeable in buildings of large size how architects were coming to the conclusion that if they were to have massive features which should bear their due relation to the whole mass of the building, they could only be obtained (given a certain flatness of façade which was almost inseparable from town houses) by being continued through more than one story. There were several new buildings which had thus justified the practice of the early part of the century.

Mr. H. L. Florence remarked that the moral of Mr. Bell's paper seemed to be that, just as it had been said that life would be enjoyable but for its pleasures, so architecture might be endurable but for its details. There was a great deal to be said for that view of the case, for one could not help seeing, in our new streets and buildings, how greatly ornament had been aimed at, to the exclusion of higher qualities. It was not, perhaps, altogether the fault of the architects, for they had to make as good a show as they could upon the limited sites with which they had to deal in erecting buildings in towns, not that that justified them in over-elaboration of detail. The same fault of over-elaborateness, however, was to be seen in painting and sculpture perhaps even more strongly than in architecture. The fussiness and restlessness of design in architecture did but reflect the modern mind, the tendency of which was also seen in the repeated changes of style. Within the last few years we had seen many changes of style, but each one soon went out of vogue, and details of any new building of very considerable size were somewhat "old-fashioned" before the roof was on. He begged to move a vote of thanks to Mr. Bell, who had done the Association great service in bringing the subject forward.

Mr. Hampden W. Pratt, in seconding the motion, said that with limited frontages, such as architects generally had to deal with in town buildings, there was little that could be done except with details, although he believed that the almost total absence of carving might be greatly compensated for by richness of colour in the materials used, but it should not be forgotten that by injudicious disposition colour might impart to a building the effect of pettiness, and worse.

Mr. J. Smith, in supporting the motion, said he thought that Mr. Bell's ascription of defective design to the undue attention paid to ornament was hardly borne out by one building in Queen Victoria-street,—viz., the new *Times* Office, which was, perhaps, the ugliest building in the street. The defect of that building was certainly not exuberance of ornament, but rather the absence of correct principles of design combined with good detail.

The vote of thanks having been carried by acclamation, Mr. Bell briefly replied, and the meeting terminated.

On Saturday afternoon last the members visited the North London Collegiate School for Girls, in Sandall-road, Camden-town, when an address was given by the architect, Mr. E. C. Robins, on the sanitation of that building.

COMPETITIONS AND CO-OPERATION.*

SIR EDMUND BECKETT, Q.C., at the Royal Institute of British Architects, on February 9th last, said emphatically "The desire to stop competition is perfectly hopeless." Now, assuming this assertion to be a fact, may I be permitted, as an old member of the profession, to endeavour, by a few remarks, to obtain some reply to the question, "Why do not architects voluntarily agree only to compete under conditions somewhat as follows, or otherwise combine in the manner we shall propose further on?" First condition.—In all public competitions, all those who desire to compete shall, as a preliminary thereto, send in their names and qualifications. Second.—From these names a certain number shall be selected, who are then to be informed thereof officially. Third.—Adequate premiums in all cases are to be stated and awarded to three designs,—say a per-centage on the proposed cost of works, one-half per cent. to the first, one-quarter per cent. to the second, and one-eighth per cent. to the third, and all the other selected competitors who compete are to receive a small stipulated sum each. The question as to the employment of professional adjudicators must be reserved for future consideration.

If these rules were acted upon, all who send in designs without being selected competitors would only have to blame themselves for any loss they may incur, and if some architects and others will persist in furnishing designs, knowing they will not be remunerated for them, surely the public will be quite justified in refusing to pay for what they can so cheaply and easily obtain.

At the present time it is quite certain that under existing arrangements, if any architect chooses to compete or work for a low fee, there is no law to prevent his doing so. If by competing he loses his time and his money, he has no moral or legal right to complain of the loss; and if any architect declines to compete he has no legal right to complain of the one who does compete; and lastly, if there are "gross evils" in competitions absolutely necessary to be rectified, architects must themselves remove them, either by the voluntary principle before referred to, or by an Act of Parliament, or charter, or by co-operation.

The voluntary principle, or each individual binding himself to fixed rules, appears to be perfectly hopeless of attainment.

The most dignified mode of procedure is by an Act of Parliament, or Charter, giving a right to practise, and it is the only decisive method; but before that rank or title could be expected or claimed, all architects must receive such a liberal education, and pass such compulsory examinations as would place them on an equality with the legal and medical professions, so as to enjoy special privileges. Until this has been done, however, all who please may style themselves architects or engineers, and we repeat that an Act of Parliament seems to be the only final way out of the difficulty, unless we can practically carry out the other principle of "co-operation"; and as to the need for co-operation, as now proposed, the want of a "new style" of procedure has no doubt long been felt by many who have watched the signs of these busy changing times.

Competition for works of all kinds exists as an established fact, and one of the great questions of the present day is,—"If competition is to continue," about which there is no doubt, "what means should be adopted in order to benefit the general body of the profession, and also the public at large?"

It is quite certain a time has arrived when architects must be prepared to make changes in their customs and practice, so as to be in harmony with modern ideas and requirements. Co-operation would certainly benefit the young and rising men of the day, who are desirous to succeed in life, but are now wasting both energy and capital in the attempt to do so.

Competitions, as at present conducted, involve great loss both of time and money, and the results are in most cases unsatisfactory and disheartening; this time and money by co-operation could be more judiciously and beneficially employed. Further, there are numbers of gentlemen among architects, engineers, and others, of undoubted talent and ability, but without patrons and with limited means; this ability and these limited means, by co-operation, could be more fully developed and utilised, as it is believed that the great resources and appliances to be secured by co-operation would ensure most of the principal works of the day being obtained by the co-operators.

There is, also, no doubt a vast amount of ordinary general work that could be done by those who have not been strictly educated or articled as architects or engineers, and it seems very unwise, and in fact impossible, to prevent such persons using the undoubted abilities they possess. The taking-out of quantities could also be done by a special staff of duly-qualified co-operators, thus settling the question as to architects undertaking that kind of business. By co-operation the public could certainly receive the benefit of the united abilities and experience of the best men in all departments of art and science.

The mode of carrying out all these suggestions must of course be settled by ample discussion, but we may state generally, that the co-operation proposed should consist of, first, public shareholders (or co-operators), English and foreign; secondly, professional shareholders, from whom could be chosen the committee of designs and heads of departments; and, lastly, the working staff shareholders, who would consist of geometrical, architectural, engineering, and perspective draughtsmen, artistic colourists, quantity surveyors, sculptors, modellers, clerks of works, writing and tracing clerks, and office lads. It is probable the best of each class would obtain permanent and remunerative employment.

The public and professional shareholders would be required to hold a definite number of shares, and the working staff shareholders would also have to hold a small minimum number in order to be eligible for employment; and the number of second and third class shareholders would have to be limited to a certain number at starting. The professional shareholders would naturally still carry on their private practice, and they would also be enabled to obtain valuable assistance from the working staff should they at any time require it.

* We print the following singular proposition, as it is useful that the ferment going on in men's minds should be known.

The profits might be divided so as to yield a fixed dividend on all shares fully paid up, and the committee of designs, heads of departments, and working staff, could receive a percentage to be arranged. A reserve fund should also be created, and the balance of profits be equally divided between all shareholders according to the number of shares held.] In addition to the various proposals made, we may add that pupils could be received in all branches of the professions; exhibitions of designs and building inventions and patents could be held, and ultimately club chambers established worthy of the profession, with lecture halls, art galleries, library, reading-rooms, and other nineteenth-century requirements. PHILIP B. LEE.

VALUE OF PROPERTY IN THE CITY AND THE EAST END.

ON Tuesday Messrs. Hards, Vaughan, & Jenkinson submitted for sale, at the Auction Mart, several lots of house-property and ground-rents in Eastcheap, Whitechapel, Bishopsgate-street, and Hackney, forming the freehold and leasehold estate of the late Mr. Charles Newby. The property contained eleven lots, the first lot comprising a freehold ground-rent of 200*l.* per annum, secured upon warehouse-premises in Little Eastcheap, in the occupation of Sir J. Causton & Sons, the ground lease being for a term of seventy years from December, 1864, at the expiration of which lease it was stated that the purchaser would enjoy the full rack rental, the present value of which was estimated at 700*l.* per annum. This ground-rent was sold for 5,800*l.* The next lot consisted of three freehold houses in Great Alie-street, Whitechapel, together with a stable and workshop, and store-rooms and warehouses in the rear, covering an area of 7,000 square feet, and producing an annual rental of 264*l.* per annum. There was a close and spirited competition for this lot, which realised 5,850*l.* A freehold shop and dwelling-house in Bishopsgate-street, let at 90*l.* per annum, was sold for 2,000*l.* The two next lots consisted of two freehold houses and shops in Hackney-road, of the estimated annual value of 70*l.* per annum each. They were sold for 1,220*l.* and 1,200*l.* respectively.

SALE OF HOUSES AND GROUND-RENTS ON THE REGENT'S PARK ESTATE.

SEVERAL leasehold residences and ground-rents on the Regent's Park Estate of the Crown Commissioners were sold by auction, at the Mart, last week, by Messrs. Edwin Smith & Co., by direction of the trustees under the will of the late Mr. Thomas Coster. The property consisted of four houses in Cornwall-terrace, Park-square, and York-terrace, and ground-rents arising out of houses in Brunswick-place, Park-square, and Ulster-terrace, producing in the aggregate a rental of 1,030*l.* per annum. The first lot offered consisted of a residence in Cornwall-terrace, described as overlooking one of the prettiest parts of the Regent's Park, and let on lease for twenty-eight years from June, 1873. The net annual rental was stated to be 170*l.* per annum, after deducting the ground-rents of 60*l.* a year, the actual rent paid for the house being 230*l.* per annum. It was sold for 2,450*l.* The second lot consisted of a residence on the west side of Park-square, let on lease at 220*l.* per annum for twenty-one years from June, 1874. The ground-rent of this house (held for ninety-nine years from April, 1824) was stated to be the nominal one of three guineas a year. It was sold for 3,425*l.*, the auctioneer remarking that not more than twelve months ago, the adjoining house, uniform with that now offered, but weighted by a much larger ground-rent, was actually sold for 5,320*l.* Lot 3, a residence, No. 8, York-terrace, let on lease for twenty-five years, from June, 1875, at 220*l.* per annum, held for an unexpired term of forty-one years and a quarter, at a ground-rent of 52*l.* 10*s.* per annum, was sold for 2,710*l.* The estimated annual rental value of the three above-named houses was stated to be 300*l.* per annum each. The next lot consisted of a residence, also in York-terrace, let on a lease, which expires in September next year, at 160*l.* per annum, the ground-rent for an unexpired term of forty-one years and a quarter being 36*l.* 15*s.* per annum. The estimated rental value of this house was set down at 210*l.* per annum. Although only commanding a much lower rent than any of the three preceding lots, there was a very active competition, and it was sold for 3,625*l.*, a considerably-higher sum than was realised by the previous lots, which was attributed to the lease so very shortly expiring, and the anticipated increase of rent. The next five lots consisted of leasehold ground-rents (forty-eight years unexpired) on houses in Park-square, Ulster-terrace, and Brunswick-square, amounting to 184*l.* 5*s.*, which realised the aggregate sum of 3,480*l.* The total proceeds of the day's sale amounted to 15,690*l.*

THE WATER SUPPLY OF THE METROPOLIS.

THE Metropolitan Board of Works, at its meetings on the 23rd and 30th of April, devoted several hours to the discussion of this question, which was introduced by Mr. Selway, who moved,—

"That it be referred to the Works and General Purposes Committee to consider and report as to the advisability of this Board applying to Parliament for an Act to improve the water supply of the metropolis, either by amending and regulating the powers of the existing water companies, by consolidating their undertakings, by providing an additional supply of pure water, or by any other means the Committee may deem desirable, with authority to confer with her Majesty's Government thereon."

It is unnecessary for us to reproduce the speech with which Mr. Selway supported this motion. He insisted strongly on the necessity of dealing with the question, especially since the introduction of Mr. Cross's Water Bill, which he regarded as dead, and beyond all hope of resurrection. He urged that the capriciousness and injustice of the companies' charges, taken in conjunction with the inferiority of quality, and, in some districts, scantiness of quantity, together with the need of a constant supply of water at a sufficiently high pressure to be of real and immediate service in the extinction of fires, were reasons which should operate with the members of the Board in adopting his motion.

On the second day of the debate, Mr. Munro moved, as an amendment,

"That the question of the supply of water to the metropolis be referred to the Works and General Purposes Committee for consideration and report, with power to confer with her Majesty's Government thereon."

After some discussion, Mr. Selway, accepting this amendment, obtained the leave of the Board to alter the terms of his motion, so as to read as follows:—

"That it be referred to the Works and General Purposes Committee to consider and report as to the necessity and means of improving the water supply of the metropolis, either by amending and regulating the powers of the existing water companies, by consolidating their undertakings, by providing an additional supply of pure water, or by any other means the Committee may deem desirable, with authority to confer with her Majesty's Government thereon."

Mr. Munro thereupon withdrew his amendment, but Mr. Tolhurst subsequently moved another amendment, to the effect that the consideration of the subject be postponed for six months. The amendment was lost, eight members voting for it and fifteen against. Mr. Selway's motion in its amended form, as above, was then put and agreed to.

It is worthy of note that in the course of the debate, Mr. Runtz and other well-known members of the Board expressed it as their decided conviction that the Board as at present constituted was not sufficiently strong to undertake the control of a work of such magnitude as the supply of the metropolis with water. The Board, it was urged, at present consisted of forty-five members, and they were overworked. If the Government saw fit to entrust the Board, as the only authority representing the metropolis at large, with the management of the water supply, it would doubtless see fit to constitute the Board on a broader basis. Indeed, in the opinion of more than one speaker, the consideration of the question of the water supply of the metropolis must go hand-in-hand with that of some improved scheme of local self-government.

The adjourned meeting of the delegates of the metropolitan Vestries and District Boards to consider the water question, was held on the 30th ult. in St. Martin's Vestry-hall, Charing-cross, Mr. E. J. Watherston in the chair. There was a large attendance, including the following metropolitan members of Parliament:—Professor Rogers, Mr. Coope, Mr. Fowler, Mr. Firth, and Mr. Torrens.

The Chairman said the point they had to consider was what step should be taken in the present session to settle this important public question. No time should be lost, inasmuch as, pending the decision of Parliament, the companies' undertakings were temporarily in trust, and at this moment were being conducted on behalf of the ratepayers. By the agreement entered into by the water companies and Mr. Cross, should no legislation be accomplished this session, the companies would retake possession and re-assume their Parliamentary powers, whatever those powers might happen to be. He held the conviction that in no circumstances should the companies be allowed to regain possession of these undertakings. Parliament must help Londoners, long-suffering as they had been heretofore, misgoverned as they had been hitherto, and they must now insist on their right to control their own water supply. At last, after repeated attempts, extending over a term of half a century, a much-desired end had been accomplished, and, if terms could be agreed upon, the ratepayers would at once enter into possession of a property which increased in value at the rate of not less than 1,250,000*l.* per annum.

After some discussion among the delegates, the following resolution was agreed to unanimously:—

"That the delegates of the various vestries and district Boards of the metropolis seek an early interview with the Premier, the Home Secretary, or other Minister, to urge the passing of a Bill without delay suspending until the end of the next Session of Parliament the power of the water companies to augment the charges made by them respectively in the Metropolis."

A second resolution, appointing a committee to prepare a memorial and to invite the metropolitan members to support the deputation, was also carried.

SUB-CONTRACTORS AND ARCHITECTS.

PITT *v.* CLARK AND OTHERS.

IN this action, tried at the Bristol Tolzey Court, before Mr. Prideaux, Mr. Poole, instructed by Mr. Sibly, was counsel for the plaintiff, Mr. Bucknill, instructed by Messrs. Salt and Parnell, for the defendant Clark, and Mr. Norris, instructed by Mr. Bedell, for the other defendants, Babbage and Terrett.

Mr. Poole, in opening the case, said that the plaintiff was Benjamin Pitt, and the defendants were William Henry Clark, George Henry Babbage, and William Terrett. The action was brought to recover the price of work done by plaintiff for the defendants under a contract for 215*l.* There was also a claim for extras over and above the contract. Defendants had severed their defences, Mr. Clark denying the contract or agreement, and saying he was only the architect, and did not order the extras. Mr. Clark also pleaded the Statute of Frauds. Messrs. Babbage & Terrett denied the contract, and that they either ordered extras or authorised Mr. Clark to give such orders. Messrs. Babbage & Terrett, who are butchers in Bedminster, desired to have a house and stables built at Hampton-place according to specifications made by Mr. Clark. A builder named John Summerville sent in an estimate for the work. That estimate was some hundreds lower than the others, and after being still further cut down to 2,500*l.*, it was accepted. At that time Summerville was an undischarged liquidating debtor; but he undertook the contract, which it was impossible for him to perform at the money. Before undertaking the contract, Summerville went to the plaintiff and asked him for an estimate for the plumber's work, which was sent in and accepted by Summerville, a sub-contract between them being subsequently entered into. Summerville's credit being almost valueless, plaintiff found it necessary to get something which would make him safe, so that he would be sure of his money, and not have to look to an undischarged debtor for payment. Accordingly, on December 23, 1878,—the contract being given in the previous June,—he obtained from Summerville an authority to Mr. Clark, the defendants' architect, to pay him 215*l.* out of the contract money. Summerville received several letters from Clark complaining of delay, and threatening to terminate the contract. On January 14th, last year, Summerville gave the plaintiff notice to do no more of the work and to send in his bill at once, and plaintiff took that notice, with the original order, to Clark, whom he told the circumstances of the case. Clark immediately told plaintiff to go on doing the work for him, thus making himself personally responsible, and promising to pay. That formed a contract altogether outside Summerville, either as a personal contract between Clark and plaintiff or as a contract in which Clark was acting as agent for the other defendants, who were responsible for it. Plaintiff proceeded with the work, Clark personally giving Pitt or his men all the orders, and Summerville never giving him a single order or interfering. In confirmation of the alleged contract between Clark and the plaintiff there was, on January 18th,—the day of their conversation,—an entry in Clark's day-book, by himself or a servant, "Pitt's price for plumbing, 198*l.*" That figure was arrived at by substituting zinc for lead. Numbers of extras were ordered by all the defendants, besides Mrs. Babbage and Mrs. Terrett. When 2,000*l.* worth of work had been done, Summerville fell into difficulties and absconded; and in June, when plaintiff had very nearly completed his part of the contract, the defendants insisted on his leaving off. When the plaintiff applied for payment, Clark refused to pay him any thing without a proper order signed by Summerville, to whom he referred Pitt for the money. The learned counsel said the solicitors on either side had agreed that the jury should not be worried with details.

Plaintiff, in the course of cross-examination by Mr. Bucknill, said he had made no claim against Summerville's estate in respect of this matter, but he claimed for money lent. Did not read the contract between Summerville and Messrs. Babbage & Terrett. Clark offered to be personally responsible for payment if witness gave him 2½ per cent.; but as that was a private matter, he had not allowed the per-centage from his account.

Mr. Bucknill and Mr. Norris submitted that there was no case to go to the jury. The former argued that the only evidence against Clark was a promise to see the plaintiff paid if he were satisfied after looking at the work. But that was not in writing, and there was no evidence of Clark being satisfied; neither was there any written

assignment of the contract so as to make the defendants liable.

At an adjourned sitting, the Judge said that, having carefully considered the evidence, he was not prepared to say that there was no evidence to go to the jury as against Clark, because he thought that there was evidence to go to them that the original contract between Summerville and Pitt was abandoned, and that there was a new contract of personal liability between Clark and Pitt. However, he felt very much inclined to think that there was no evidence against the other defendants at all, and that if the action had been brought against them alone he would have at once directed a non-suit, though, looking at the peculiar nature of the case, he did not think he ought to adopt that course.

Mr. Bucknill having opened his case, denying that Mr. Clark had in any way made himself liable,

Mr. Norris intimated that he should reserve any remarks until after he had called his clients.

Mr. W. H. Clark, who was then called, said he acted as architect for the other defendants. On January 15th last year plaintiff offered him 2½ per cent. as a bribe, but he declined it. Did not say, "You go on with the work, and I will look it over and see you paid," or anything like it. Never made himself liable either for the original cost of the plumbing (215*l.*), or for the extras.

Mr. Babbage, one of the defendants, examined by Mr. Norris, said he saw Pitt on the work, and knew that he was doing the work for Summerville. He never employed him, nor authorised Mr. Clark to employ him.

After some further evidence, the Judge summed up, and the jury returned a verdict in favour of all the defendants.

Judgment accordingly was given, with costs.

PROVINCIAL NEWS.

Wolverhampton.—At a meeting of the Free Library Committee of the Wolverhampton Town Council on the 26th ult., the tender of Mr. Bedford, for the additions to the Free Library Buildings, according to the plans and specifications of Mr. S. Johnson, architect, for the sum 3,003*l.* 11*s.* 5½*d.*, was accepted. This was the lowest tender; the highest was 1,500*l.* more. The proposed enlargement of the Free Library Buildings is on an extensive scale, comprising a large increase of general reading-room accommodation, the provision of a reference library, the erection of a large lecture-hall, numerous class-rooms, and a special building for the conservancy of specifications of patients.

Barnsley.—On the 28th ult. the newly-erected Court-house at Barnsley was formally opened. The structure is Gothic in style, with a tower over the north-west entrance 78 ft. in height. There are two entrances, one for the magistrates and one for the public. The principal court is 60 ft. long and 37 ft. wide, and the second court 47 ft. 6 in. by 25 ft. There are waiting-rooms for witnesses, private offices for the magistrates' clerk and his assistants, with retiring-rooms for the Bench, and every requisite convenience. Under the court is a large drill-shed, which will be used by the rifle volunteer corps and the police.

Stafford.—On the 30th ult. a new foot-bridge connecting the town with the Newport-road was formally opened. The construction of the bridge has been carried out under the direction of its designer, Mr. J. B. M'Callum, the borough surveyor; the contractors for the ironwork were Messrs. Rudge & Griffith, ironfounders, Stafford. Supported on cast-iron columns, carrying wrought-iron girders, the bridge, is 256 ft. long and 8 ft. wide, and each of the columns rests on a pile driven into the ground to a depth of 15 ft. The total cost of the bridge will amount to about 650*l.* Of this sum the contract for the ironwork absorbed 329*l.* 14*s.*, and there are some extras under this head amounting to about 10*l.* The foundations cost 145*l.*, and the remainder of the expenditure embraces the raising of the approaches, chiefly at the mill-end of the structure, and the removal of the old bridge.

Ashtead (Surrey).—A drinking-fountain, partaking somewhat of the character of an Eleanor Cross, has just been erected by the wayside in the pretty little village of Ashtead, near Epsom, as a memorial of the Hon. Mrs. Mary Greville Howard. Standing upon four octagonal-shaped steps, the structure is octagon in plan throughout. Its lower parts are constructed of grit stone, whilst the upper portions are of Ancaster stone. It has been carried out from the designs of Mr. C. Hodgson Fowler, diocesan architect of Durham, by Mr. S. B. Burton, builder, of Newcastle-on-Tyne. The carved work thereon is by Mr. Harry Hems, of Exeter.

Glazing.—At the Army and Navy Provision Market, Regent-street, which was opened on Tuesday, the 4th inst., the glazing on the principal roof is done on Mr. Helliwell's patent system, without putty. There are between 3,000 ft. and 4,000 ft. of it.

CONCRETE WORK.

LIVERPOOL ENGINEERING SOCIETY.

THE usual fortnightly meeting of this Society was held on Wednesday, the 5th inst., at the Royal Institution, Colquitt-street, W., Mr. Alexander Ross, president, in the chair, when Mr. E. H. Allies, Assoc.-M.Inst. C.E., read a paper on the "Victoria Docks Extension, with a few remarks on Concrete Work."

The author began by describing the site of the Victoria Docks on the Thames, and the extension works which are now being carried out there. The site was originally known as Plaistow Marsh, and is very favourably situated for the formation of docks, being between two bends of the river, and its surface considerably below Trinity high-water. The different strata encountered in the excavation of the docks were described, and shown on a section giving their thicknesses. It was shown that the materials found on the site led to the construction of these docks entirely of concrete, at a very much less cost than masonry. The extension comprises some rather heavy railway tunnelling, a branch of the Great Eastern line having to be carried beneath the dock. The dock-extension proper consists of two timber jetties leading to the entrance lock 800 ft. long, and which opens into the great dock of 90 acres, itself connected with the old Victoria Dock by a canal or passage. There are two graving docks, and two swing-bridges of 80 ft. span each cross the dock at either end. The excavation, which was very heavy, was in great part carried out by the aid of machinery, which was described, the formation of the subsoil being very favourable to its successful employment. The composition of the concrete was given, also the mode of mixing and placing it in position. The length of the new work, which covers an area of about 500 acres, nearly 100 of which are water, is almost 1¾ miles. The plant used by the contractors was described, and the amount of excavations and other work given. This paper was illustrated by several drawings. (These docks, we may add, were fully described in the *Builder* two or three years ago.)

The author also read a supplementary paper on the use of concrete for work of this description, and gave instances of its use for dock and harbour work in this country and on the Continent, with the methods of applying it, and its various compositions.

LAYING THE FOUNDATION-STONE OF ST. ALPHEGE'S CHURCH, SOUTHWARK.

THE Earl St. Germans has laid the foundation-stone of a new mission church, which is about to be erected in Lancaster-street, Southwark, a short distance to the east of Blackfriars-road, and approached from the south out of the Borough-road. The neighbourhood in which the church is situated is in the heart of the most destitute part of one of the poorest quarters of London, and described as "the stronghold of the South London 'roughs.' Round about are thieves' dens, low music-halls and dancing-rooms, lodging-houses for tramps and rogues, taverns and other houses of bad repute, reeking and fever-breeding courts, where the poor are huddled together in vice and misery." The new church will stand upon a site belonging to the Corporation, which has been leased from that body for a term of eighty years, at a ground-rent of 75*l.* per annum. The church, which will be externally faced with red brick and Bath stone dressings, will be plain and simple in its architectural features, but of large dimensions. The extreme length of the edifice will be 99 ft., and its width 44 ft. Of this area, 80 ft. in length and the entire width of 44 ft. will be occupied by the nave, no aisles being provided for in the plans. The chancel, organ-chamber, and altar-space will take up the remaining portion of the area. There will be seating accommodation in the church for a congregation of 1,500 persons. The interior walls of the edifice will be faced with varied coloured bricks, moderately decorated. Running the entire length of the east side of the edifice, but separated from it, with the exception of the clergy and choir vestries, there will be a number of class-rooms. The plans likewise include the erection of a clergy-house. The cost of the building is estimated at 6,000*l.*

Mr. R. Willey, of Ludgate-circus, is the architect, and Mr. P. Sharpe is acting as his clerk of works. The whole of the foundation walls have already been got in, but the contract for the superstructure has not yet been entered into, although the tenders have been sent in.

NEW VESTRY HALL FOR THE PARISH OF EALING.

ON the 28th ult. this building, which has just been erected, was taken possession of for the transaction of parochial business. In the front portion of the building, close to the public entrance, is the vestry clerk's office, with a strong room attached fitted up with slate shelves for books. The iron door was supplied by Milner's Safe Company, Limited. In close proximity to the vestry clerk's office, and in communication with same, is provided a committee-room. Communication with this room is also gained by a private passage, by the side of which, and entered from the passage, is placed w.c., urinal, and lavatory, for the use of vestry clerk and committee. At the rear of the building is placed the hall, capable of accommodating 300 persons. This hall will be used for public meetings, &c. Two entrances are provided at each end of the hall, one for the use of the public and the other for members of the vestry. This latter is arranged next the committee-room, and near the platform erected in the hall. The hall has an open roof, with moulded ribs plastered between. The ceiling, also the walls above the dado, are distempered. The dado is in Parian cement, painted Pompeian red, with black skirting and border. Fresh air is brought into the building on the "Tobin" system, the foul air being taken off by a turret in the roof. The whole of the internal joiners' work is in deal, stained and varnished. Externally the building is faced with red Suffolks, with Westwood stone dressings to gables, windows, &c. The design is Gothic.

The whole of the building, including chimney-pieces, portions of gas-fittings, and furniture, has been designed and carried out under the superintendence of the architects, Messrs. Harnor & Waters, of John-street, Adelphi, W.C. The works have been executed by Mr. T. Nye, builder, Ealing. Mr. Lumley acted as foreman of works. The carving was done by Mr. W. Plows, of Shepherd's-lane, Brixton.

CHURCH OF ST. LAWRENCE, IPSWICH.

SIR,—In reference to the "Design for Restoration of the Tower of St. Lawrence Church, Ipswich," exhibited at the Academy, kindly allow me to say that the name of Mr. Barnes, Hatton-court, Ipswich, should have been associated with my own, but has been omitted from the catalogue, though duly sent for insertion.

HOWARD GAYE.

CHURCH-BUILDING NEWS.

Burnley.—The Church of St. John the Baptist, Gannow, Burnley, the gift of the Rev. W. Thursby, of Ormerod House, and Lady Scarlet, was consecrated on the 8th of April by the bishop of the diocese. The plan of the church consists of a broad nave (all the benches are placed within the arcade, the aisles being used as passages only), north and south aisles, and chancel. There is a south chapel to the chancel, and a south transept to the nave. On the north side are a vestry and organ-chamber. A tower to the west end, and two bays of the nave, have still to be added. The style adopted is that of the thirteenth century. The exterior of the church is faced with parpoints, with Noggarth stone dressings, Bath stone being used in the interior. The woodwork in roofs, benches, &c., is of pitch pine, and the building is slated with Westmorland green slate. The chancel furniture (including choir benches, lectern, north and south screens, altars, credence), and case for organ (by Messrs. Jardine & Co.) is in Dantzic oak. The pulpit and chancel parapet are in alabaster. The chancel is covered with tiles, and the steps are in dark red and grey marbles. The church is heated by means of hot water on the low-pressure people. The church, when completed, will seat over 600 persons, 500 seats being provided at present. The cost, including organ and laying out the grounds, will be 8,000*l.* The architects are Messrs. Wm. Waddington & Son, Burnley and Manchester.

Glascote.—The new church of St. George, Glascote, a small edifice which has been erected to meet the requirements of the increasing mining population of this outlying district of the parish of Tamworth, was consecrated on the 30th ult. by Bishop Abraham, acting for the

bishop of the diocese. The church, which stands on a site of a quarter of an acre, given by Mr. R. W. Hanbury, formerly one of the members for the borough, is built of local red brick and Bath stone. It consists of a nave of four bays, a chancel and sacrarium, and a southern aisle. The tower, which is gabled towards the east and west, stands over the space which forms the chancel, the sacrarium projecting beyond it to the east. Both the chancel and sacrarium are covered with stone groining. The aisle projects eastward beyond the nave, and forms an organ-chamber opening into the chancel, and a vestry opening into the sacrarium. To the north-west of the church is a porch, the doorway of which is surmounted by a niche, which is intended eventually to contain the figure of the patron saint of the church. A corresponding niche is placed in the north wall of the sacrarium. The total length of the church is 86 ft., and the total width, exclusive of porch, is 34 ft. The height to pinnacles of tower is 59 ft. The church is built in strict conformity with the period known as Late Middle Pointed. The church is fitted with stained and varnished pine seats, to accommodate about 200 persons, and all the seats are free. The roof is open timbered. Artificial light will be obtained from ten five-light gas pendants, and the church will be heated by a stove. The total cost of the church was about 3,015*l*. Messrs. Clarson & Sons, of Tamworth, were the contractors, and Mr. Basil Champneys, of London, is the architect.

Dartington.—The old church at Dartington, near Totnes, dedicated to St. Mary, was built in the time of Richard II., and stood close against the old hall in Dartington Park. Some twenty-five years ago the building was restored, under the direction of a young architect named Pearson. Recently, it was determined to build an entirely new church, and with that aim in view the same architect, who now signs himself "John Loughborough Pearson, A.R.A.," was consulted. The new church, dedicated, like its predecessor, to St. Mary, does not stand upon the same site as the old one. It has been built upon a much more convenient spot, about a mile away, just outside the village, upon the Ashburton and Totnes turnpike-road. The lines of the old structure have been followed in the new one, and much of the ancient building has been rebuilt into the new structure, which was consecrated on the 27th ult. by the Bishop of Exeter. The foundation-stone was laid on July 2nd, 1878, and the works have proceeded actively ever since. The contractor for the work was Mr. Jonathan Marshall, of Plymouth. The sum of 12,000*l*. has been spent on the building. The style of architecture is Perpendicular, and the building on plan consists of a nave, north and south aisles, chancel, vestries, south-west porch, and a fine western tower. The materials used, in the main, are limestone from Shinner's Bridge for the walls generally, and Box-ground stone for the dressings. The windows are large, and chiefly of four lights. A Flamboyant window at the east end of the south aisle, the south window and east end window in the chancel, and the window in the north transept, are from the former church. The old granite battlements have also been preserved, and now stand in similar positions on the north and south aisles: continuation, but more ornate, is carried around the chancel in freestone. The blue slates with which the church is covered are also old, and they are surmounted by a red crease. Two octagonal turrets, surmounted by crocketed spirelets, stand at the eastern end of either aisles; they give the line of division between nave and chancel. The south-west porch is groined with the old groining. This porch is carried up the height of the church, having a room over it for keeping church documents in. The tower is 82 ft. high. Below the belfry windows is a band of tracery, and these windows themselves are filled in with stone traceried panels. The masonry throughout the building is finished with a black mortar joint, which has a good effect, and is soundly constructional. There is a deal of stone carving upon the edifice, particularly upon its exterior, and this, together with the sculpture adorning the church, is the work of Mr. Harry Hems, of Exeter. Internally, the nave and aisles are separated by lofty arcades of four bays, the columns, caps, and arches of which are richly moulded. Much of this stonework is old, and the roofs have also, in the main, been brought bodily from the former church. The old pulpit, of carved oak, and the ancient rood-screen, have been re-fixed. The floors of the chancel and sanctuary are laid with Godwin's encaustic tiles. The windows are glazed with Pepper's cathedral glass. The organ, built for the old church fifteen years ago, which, however, was never erected there, but has stood till now in the vicarage, has been fixed by its maker, Mr. Speechley, of London. The hot-water apparatus is by Mr. George Marshall, of Plymouth, who has also fixed the hydraulic motor for blowing the organ. The church is built to seat 280 persons. Adjacent to the church a new house for the schoolmaster has been built. The works have been satisfactorily carried out under the direction of the clerk of works, Mr. James Babb, of London, Mr. Dan. Delafield, of Paignton, being the contractor's foreman. Mr. Babb has been appointed clerk of the works of the new cathedral of Truro, the erection of which is to be forthwith commenced, from plans by the same architect.

OBITUARY.

The Late Mr. George Wood.—The death of this gentleman, on the 22nd ult., at the age of 73, is announced. Mr. Wood was sole proprietor of the Albion Blue Brick and Tile Works, but had retired from active business four or five years previously to its conversion into a limited company. He was connected with the early railway enterprise, and his well-known energy and business capacity would probably have placed him in the foremost rank of railway contractors, if he had not been overtaken by a severe illness, which compelled his retirement from business. At the expiration of four years, however, his health had so far improved that he was able to recommence in business as a brick manufacturer, and that business he raised to an important industry, opening up an extensive trade in London and on the Continent, which has proved to be very successful. His remains were interred at the West Bromwich Cemetery.

Miscellanea.

New Lamp Lighting and Extinguishing Apparatus.—Upwards of two months ago a novel apparatus was applied to ten of the public lamps between Pond-hill and the General Post-office, Sheffield. This was done by way of experiment, and to test the invention of Mr. G. Weston, of that town, for lighting and extinguishing public and other lamps. The test has (according to the local *Independent*) proved thoroughly satisfactory, and it will now be for the members of the corporation, for whose inspection the apparatus has chiefly been applied, to express their opinion of it, and say whether it warrants adoption. There are three methods in which Mr. Watson's novelty can be used. That which is at present in operation nightly is the pneumatic process, applicable to towns like Sheffield, where the uphill-and-down-dale situation of the streets causes anything like a uniform pressure of gas difficult to maintain. In this case there is a small apparatus in which air under pressure controls a valve which prevents the flow of gas to the burner, or just as the pressure is given or removed so will the gas flow or stop. This plan, as Mr. Weston states, requires the fixing of a very small air-pipe from lamp to lamp, and in connexion with an air-vessel or tank, constructed the same as a gas-holder, but infinitely less in capacity, having to convey pressure only, not quantity of material, none being used. The air-pipe may be fixed to the sides of the buildings, or stretched from house to house across the streets, and thereby save great expense in taking up the pavement. Any police-officer on duty at the proper time, or when it is dark (he suggests), by turning a tap could light up a whole town or district in a few seconds, and *vice versâ*. The lighting the lamps in this method of controlling the flow of the gas is accomplished by keeping constantly burning a small portion of gas in a pipe or sieve, and protecting the same from extinction by surrounding it with an outer defence. The pipe is in close proximity to the ordinary burner, and immediately the gas issues it is ignited by the burning gas. Mr. Weston's other methods, in addition to the pneumatic, are the automatic (which he claims is the simplest and least expensive), varying the pressure of the gas; and the electric, using a current of electricity to close the gas valves to each lamp.

Freemasons' Hall, Wakefield.—The remaining part of the old Rectory in Wakefield, which for a number of years past has been used as a lodge for the Freemasons, is now undergoing demolition to give place to the new Freemasons' Hall to be erected on the same site. The new building will have a frontage to Zetland-street of 72 ft. At the west end of the site will be the principal entrance, instruction waiting-rooms, and other conveniences. The centre of the building will contain two rooms, each 33 ft. by 21 ft., by 14 ft. high; the upper room for the lodge meetings, and that on the ground-floor for the banqueting-room. The eastern wing will be the caretaker's residence of six rooms. Cellarage is provided, and a communication will also be made with the old arched cellars running across the street and into the old vicarage-grounds, which will be retained. The materials used will be red pressed bricks and Huddersfield stone for the front; the large rooms inside will all be plastered, and have coved ceilings, and part of the present old oak staircase will be re-fixed in the new building, the remainder made out to harmonise. Mr. William Watson, of Wakefield, is the architect employed. The contracts for the various works have been taken by local contractors at under 1,300*l*.

New Roman Catholic Church.—A new Roman Catholic Church, built by the Dominicans or "Black Friars," is now approaching completion in the north-western suburbs. It stands at the foot of Haverstock-hill, near the old River Fleet, and a little beyond Kentish Town and Camden Town, in the direction of Hampstead-heath. The new church is already roofed in. It is about 200 ft. in length, and in breadth about 80 ft., and the ridge of the roof externally is above 100 ft. from the ground. It consists of a long nave and chancel, not divided, however, by any internal arch, two aisles, a large lady-chapel, and two porches at the lower end of the nave. The chancel is apsidal. The roof is of high elevation, and will be decorated in polychrome. The style is Transitional, between the Early English and the Decorated. The architect is Mr. Charles Buckler, and the builders are Messrs. Kelly, of Windsor. The total cost of the erection of the building, exclusive of internal fittings, &c., will be about 21,000*l*.

The Fire in Aldersgate-street.—The suddenness of the outbreak of this fire, and the appalling rapidity with which, in mid-day, it spread to the adjoining properties, have attracted much attention, and at the meeting of the City Commissioners of Sewers, on Tuesday last, Mr. Innes moved

"That it be referred to the Sanitary Committee to report to this Court on the law with reference to the storage of dangerous chemicals in bulk within the City, and the existing powers of this Commission in reference thereto."

He said that the Explosives Act, administered by the Court of Aldermen, was based on the common law relating to nuisances; it was in no way derogatory to that law. If that measure had not been in existence the Commission would have had power to regulate the storage of explosive materials. He ventured to submit that the storage of such goods which, when exploded, would destroy a four-story building in seven or eight minutes, constituted not a small but a gigantic nuisance. The motion was carried.

Chambers's Patent Sand Distributor.—This machine is intended to supply a want long felt, in order to improve the conditions of the traffic in the streets of London and other crowded cities. It is not only for the asphalte and wood pavements that the addition of sand, or rather of *ballast*, is found so necessary; but also for macadam roads, in order to maintain the due supply of bond-material, and this machine, as manufactured by Messrs. Garrett, is well calculated to meet all the conditions peculiar to the case. The action of the machine is almost noiseless, the spread of the ballast (a most irregular composition of sand and stones) is perfectly regular and uniform, and as the width of the spread is confined within the wheels of the machine, annoyance and hindrance to the passing traffic is entirely obviated.

Exeter Hall.—A correspondent writes:—"The London Young Men's Christian Association has contracted to purchase Exeter Hall, and the conveyance is to be signed during the present week. The sum of 25,000*l*. is to be paid for the building, and 15,000*l*. more will be spent in adapting it to the requirements of a central association, for which it is to be used. Both these amounts have been already provided."

The Control of Buildings.—In replying for "The Visitors" at the recent Royal Academy dinner, the Archbishop of Canterbury, after referring to the merits of the exhibition, said,—Before I sit down, let me beg the members of the Academy to consider with me for one moment a practical matter, quite unconnected with criticism, in which I think they may go hand in hand with all who wish to promote the highest cultivation of the inhabitants of this city and of England. In France there is a controlling hand which prevents Paris from being defaced by very hideous constructions. I am sure that the general effect of looking day after day upon a hideous building is debasing,—I will not say demoralising. Why should any set of men in England be allowed at their own arbitrary will to insult the sacred precincts of Westminster Abbey, the Broad Sanctuary, by erecting a debased miniature of the dead-meat market in Smithfield? And why should a private person be allowed to overshadow the whole city of Westminster by a building akin to the Tower of Babel not only in size, but chiefly from its being made of bricks and being a mass of confusion? If a man wishes to give his tenants mountain air on the plain of London in certain lodgings which we may call mansions of the moon, surely he ought to be compelled by some higher authority to erect his monstrous tower according to some plan approved by the arbiters of taste.

Batten's Ventilators and Man-Hole Covers or Sewers.—The object of these arrangements, which have been patented by Mr. W. Batten, C.E., of Handsworth, near Birmingham, is to provide a combined ventilator, flushing-box, and lamp-hole for sewers. The road-waste is retained from falling into the sewers by two external chambers which receive it, and the arrangement is such that while the ingress of water and road-waste is carried on, provision is made for the egress of sewer-gases, so that the inlet of the one and the escape of the other may be always continuous. The removal of the solid matter is effected in a few minutes by simply inserting a piece of bent flat iron into the dirt-receiving boxes, or external chambers. By withdrawing a bolt, that temporarily fixes the cover, free access is given to the ventilating shaft for the introduction of a lamp, or for the purpose of flushing the sewers. The invention has advantages in regard to the separation of the solid from the liquid matter, readiness of removal of the solid, free ventilation of the sewers, and easy access to them for all purposes. We understand that many of them have been used in Birmingham, Walsall, Warwick, and other districts.

The Topographical Society of London.—A number of gentlemen have formed themselves into a provisional committee for the purpose of receiving the names of those who are willing to aid in the formation of a Topographical Society for London. The want of some general organisation by means of which the constantly changing phases of the "world of London" shall be registered as they pass away has long been felt. Such a centre for London topography it is the aim of the committee to found. Every day landmarks are swept away, often with little present notice, and generally with total forgetfulness on the morrow, so that if the society is started now it will not be formed a day too soon. It is proposed to call a public meeting as soon as proof is given that the scheme will have support. Mr. Henry B. Wheatley, of 5, Minford-gardens, West Kensington Park, will give any information that may be desired.

Examiners for District Surveyors.—The Royal Institute of British Architects have elected the following gentlemen to serve on the Board of Examiners (appointed under the Metropolitan Building Act, 18 & 19 Vict., c. 122, s. 33) for the year of office 1880-81, viz., Messrs. G. Aitchison, B.A., T. Blashill, Francis Chambers, Charles Fowler, E. l'Anson, F.G.S., Joseph Jennings, Robert Kerr, James Thomas Knowles, J. D. Mathews, H. Parsons, F. W. Porter, T. Roger Smith, and Sancton Wood.

"Misappropriated Designs."—Mr. Tall has written to deny that he has made use of a design by Mr. Percy Hunter, as alleged in a letter to the *Builder* by that gentleman. Mr. Hunter reiterates his assertion, and we must leave the two gentlemen to settle the matter themselves. A statement by Mr. Tall that Mr. Hunter's roof would not have kept out water has nothing to do with the question.

Rotherham Public Baths Competition.—At a meeting of the Baths Committee of the Rotherham Town Council, on the 27th ult., it was agreed that the committee should choose six of the best plans sent in, to be submitted to the council for their selection of the premier plans. The report of the committee came before the council on Wednesday last, May 5th, when it was decided that the six competitive plans should be exhibited in the Council Hall for fourteen days for the inspection of the members of the council only, and at the expiration of that time the council will make a selection.

An Arbitration Room for Architects.—The directors of the Architectural Union Company, having been repeatedly asked to provide rooms for arbitrations, have taken advantage of the recent alterations on their premises, No. 9, Conduit-street, and have fitted up a spacious and well-lighted Arbitration Room on the ground-floor, together with two consultation-rooms in connexion therewith. The members of the profession will doubtless avail themselves of the accommodation which is now afforded.

Church of Christ, Southampton.—Plans have been prepared by Mr. A. Martin for the erection of this place of worship, on the site of the vacant piece of ground adjoining the Philharmonic Hall. It will be in the Lombardic style, with terra-cotta capitals and dressings. It will be built of white brick, relieved by red and black; principal entrance is to be in Above Bar-street, with side entrances in the recently-constructed street, and adjoining the Philharmonic Rooms. The length of the building is to be 100 ft., 48 ft. wide, and 50 ft. high.

Cumberland and Westmorland Antiquarian and Archæological Society.—At a meeting of the Council of this Society, held at Penrith the other day, it was arranged that the first summer meeting of the season should be held in the middle of June, at Workington. The Society now numbers over 300 members.

London Water Supply.—The Council of the Society of Arts have decided to summon a public Conference to consider the question of supplying London with pure water. The date for the Conference has been fixed for Monday, the 24th of May, and succeeding days. The arrangements for the Conference are now being considered by a committee, and full announcements will be made as early as possible.

Budleigh-Salterton.—At a meeting of the Local Board of Health of the watering-place of Budleigh-Salterton, Devon, held on Monday, the 26th ult., Mr. C. W. Whitaker, of Great George-street, Westminster, was appointed to carry out the proposed scheme for the water-supply of the town.

Builders' Benevolent Institution.—An election of pensioners on the funds of this institution will take place on Thursday next, the 13th inst., at Willis's Rooms, St. James's. There are vacancies for five annuitants, two men and three women, and there are eight candidates,—two men and six women.

A Boulevard for Pendleton.—On the 24th ult. forty-eight ladies planted as many trees in Langworthy-road, Pendleton. The trees have been planted at the expense of Councillor B. Armitage.

Musgrave & Co. (Limited) have been awarded a gold medal for their exhibits at the Sydney Exhibition.

TENDERS

For Staines Town-hall. Mr. John Johnson, architect. Quantities supplied:—

Oades & Sons	£7,221 0 0
Squelch	7,032 0 0
Thompson	5,940 0 0
Falkner	5,898 0 0
Crockett	5,700 0 0
Watson	5,645 0 0
Smith Bros.	5,625 0 0
Johnson	5,599 15 0
Taylor & Grist	5,572 0 0
Simonds	5,555 0 0
Conder	5,540 0 0
Reading	5,506 0 0
Ansell	5,375 0 0
Jarvis	5,373 0 0
Braid & Co.	5,271 0 0
Jones & Co.	5,230 10 0
Messom	5,226 0 0
Coles	5,060 0 0
Stimpson & Co.	5,042 0 0
Reavell	5,000 0 0
Wall	4,989 0 0
Williams	4,940 0 0
Kirk & Randall	4,797 0 0
Brunsden (accepted)	

For dividing No. 6, Bedford-square, formerly the residence of Lord Eldon, into two houses. Mr. W. P. Griffith, architect. Quantities not supplied:—

Lidstone	£3,711 0 0
Nixon	3,175 0 0
Brown	2,999 0 0
Dunford & Langham	2,994 0 0
Chapman	2,577 0 0
Pocock	2,359 0 0
Temple & Forster	1,845 0 0

For two pairs of semi-detached residences, Park-road, High Barnet, for Messrs. Turner & Barr. Messrs. Brooking & Nelson, architects. Quantities not supplied:—

Miller	£3,980 0 0
Teadluther	3,600 0 0
Craske	3,400 0 0
Tomes	3,240 10 0
Johnson	3,196 0 0
Scales & Norris	3,015 0 0
Marriott	2,817 10 0
Howard & Gordon	2,816 0 0
Langmead & Way	2,800 0 0
Burdett & Sons	2,750 15 0

For Spalding Grammar School. Messrs. Giles & Gough, architects. Quantities prepared by Mr. G. C. H. Goode:—

Bell & Son, Cambridge	£3,633 0 0
Sharman, London	3,295 0 0
Dawson, Spalding	3,185 0 0
Harrison, Spalding	3,124 0 0
Pattinson, Ruskington	3,120 0 0
Bulling & Co., Allerton, Newark	3,075 0 0

For completing five houses in the main Bromley-road, Priory Estate, Catford, Lewisham, for Mr. Horace Kent. Mr. W. C. Banks, architect:—

Edwards (accepted)	£1,700 0 0

For alterations at the Admiral Nelson Tavern, Carlton-road, Kilburn, for Messrs. B. Taylor & Co. Mr. W. F. Potter, architect:—

Edwards	£235 0 0
Lamb	196 14 0
Hayworth	187 0 0
Pritchard	179 0 0
J. & H. Cocks	178 17 6
Simpson & Annett	175 7 0
Royal	174 0 0
Davy	135 0 0
Butler (accepted)	132 0 0

For alterations and additions to the Abbey Lecture-hall, Reading, for Mr. M. J. Sutton. Messrs. Brown & Albury, architects:—

Kingerlee	£1,597 0 0
Higgs	1,527 0 0
Woodroffe	1,470 0 0
Strong	1,448 0 0
Sheppard	1,440 0 0
Simonds	1,433 0 0
Searle	1,369 0 0

For the erection of new lodge and coke store, Upper Norwood, for the Committee of the Royal Normal College for the Blind. Mr. Sextus Dyball, architect. Quantities supplied by Mr. W. E. Stoner:—

	Lodge.	Coke Store.
King & Son, Aldgate	£796 0 0	£350 0 0
Wright, Upper Norwood	690 0 0	416 0 0
Bowyer & Son, Upper Norwood	730 0 0	320 0 0
Rudkin, Fulham	695 0 0	350 0 0
Taylor, Brixton	533 0 0	297 0 0

For two houses and shops at Stratford, Essex, for Mr. T. Farish. Mr. John Hudson, architect. Quantities not supplied:—

Bentley, Waltham	£1,677 0 0
Norton & Son, Stratford	1,298 0 0
North Bros., Stratford	1,297 0 0
Sharpe & Mills, Tottenham	1,290 0 0
Gregar, Stratford	1,289 0 0
Hosking, Upton	1,283 0 0
Reed, Stratford	1,240 0 0
Gentry, Stratford (accepted)	1,200 0 0

For painting and other works at the Charterhouse-street Branch of the London Joint Stock Bank. Mr. R. C. Harrison, architect:—

Simpson & Sons	£136 10 0
Pitman & Son	103 0 0

For painting and other works, new water-closet, &c., at No. 10, Beaufort-buildings, Strand, for Mr. C. F. Wassall. Mr. C. T. Robertson, architect:—

Pitman & Son	£177 13 6
Downs	161 0 0
Macey & Sons	149 18 0
Ramsey	134 0 0

For factory, Warwick-square, Newgate-street, for Messrs. A. & W. H. Tylor. Messrs. A. & C. Harston, architects:—

Crockett	£14,827 0 0
Conder	13,995 0 0
Morter	13,460 0 0
Kirk & Randall	13,460 0 0
Hall, Beddall, & Co.	13,395 0 0
Brass	13,790 0 0
Peto	13,173 0 0

For the construction of new road and pipe sewer on the British Land Company's Blackheath Estate. Mr. Henry B. Mitchell, surveyor:—

Mowlem, Freeman, & Co.	£1,230 0 0
Dunmore	1,019 0 0
Killingback	1,000 0 0
McKenzie & Co.	1,000 0 0
Bloomfield	980 0 0
Keeble	973 0 0
Thompson & Covington	890 0 0
Jackson	883 0 0
Pizzey	879 13 0
Wilson	876 0 0
Nowell & Robson	865 0 0
Acock	845 0 0
Harris	769 0 0
Peill (accepted)	758 0 0

For residence, Eastcote, near Pinner, for Sir Hugh Campbell, bart. Mr. Prior, architect. Quantities by Messrs. Palmer & Rudulf:—

Bangs & Co.	£7,400	0	0
Dove Bros	6,875	0	0
Fish	6,870	0	0
Ansell	6,666	0	0
Kimberley	6,423	0	0
Perry & Co.	6,343	0	0
Braid & Co.	6,240	0	0
Kendal	6,195	0	0
Kerley	6,180	0	0
McLachlan & Sons	5,978	0	0

For new villa residences, Sheet-up-hill, near Kilburn, for Mr. Seaton. Mr. R. Down, architect. Quantities by Messrs. Widnell & Trollope:—

Sheffield & Prebble	£7,973	0	0
Stimpson & Co.	7,866	0	0
Manley	7,837	0	0
Morter	7,643	0	0
Nightingale	7,594	0	0
Lawrence	7,535	0	0
Andrews	7,518	0	0
Scrivener & Co.	7,511	0	0
McLachlan & Sons	7,478	0	0
Shepherd	7,473	0	0
Jackson & Todd	7,200	0	0
King	5,998	0	0

For new villa residences at Orpington, near Chislehurst, for Mr. A. Brown. Mr. Francis Chambers, architect. Quantities by Mr. Baggett:—

Wright	£7,176	0	0
Greenwood	7,111	0	0
Conder	6,960	0	0
Grubb	6,606	0	0
McLachlan & Sons	6,365	0	0
Pocock	6,348	0	0
Jerrard	6,198	0	0
Grover	6,183	0	0
Hadsman	6,172	0	0

For house, at Holloway. Mr. W. Paice, architect. Quantities supplied:—

Smith	£1,005	0	0
Sheffield & Prebble	973	0	0
Mitchell	898	0	0
Linzell	897	0	0
Downs & Co.	896	0	0
Chapman	895	0	0
Ward	891	0	6

For the erection of Sunday Schools and Lecture Hall, Contract No. 1; and Mission House, Committee Rooms, and Caretaker's Apartments, Contract No. 2, for the Building Committee, St. Barnabas, Homerton. Mr. Edward Witts, architect. Quantities supplied:—

	No. 1.	No. 2.
Nash	£2,875	£1,855
Dove Bros.	2,695	1,780
Shurmur	2,483	1,510
Gentry	2,460	1,650
Morter	2,428	1,535
Lathey Bros.	2,413	1,570
Williams	2,410	1,583
Jones	2,339	1,610
Stimpson & Co.	2,309	1,539
Wood	2,067	1,345

For the erection of a warehouse at Haggerstone. Mr. Daniel R. Dale, architect:—

Perry & Co.	£830	0	0
Steel Bros.	781	0	0
Tully	756	0	0
Hoare	748	0	0
Durnford Bros.	718	0	0

For furniture and carpets for the Town-hall and offices of St. Mary Abbotts, Kensington:—

	Furniture.	Carpets, &c.
Nosotti	£1,821 3 6	£143 6 11
W. A. & S. Smee	1,635 17 0	118 16 3
Hewetson & Milner	1,725 15 0	123 12 0
Brew & Claris	1,650 17 11	127 3 3
Walker & Sons	1,612 19 0	110 12 0
Pinch & Co. (accepted)	1,532 9 6	122 2 9

For five houses at Plumstead, for Mr. R. Hunter. Mr. F. A. Davey, architect. Quantities by Messrs. Strudwick & Mennie:—

Langmead & Way (accepted).

For the erection of four detached residences at Thornton Heath. Mr. Daniel R. Dale, architect:—

Dale (accepted)	£3,200	0	0

For alterations and additions to No. 136, Euston-road. Mr. Josiah Houle, architect:—

Hunt	£1,028	0	0
Wilson & Exton	899	0	0
Langmead & Way	881	0	0

For road and sewer-works on the Barton Hill Estate No. 3, Bristol, for the United Land Company, Limited:—

J. & E. Shellard	£2,559	19	0
Davies	1,775	0	0
Jones & Parker	1,444	0	0
Lovell	1,442	0	0
Osborne	1,385	5	5
Martin & Thomas	1,196	6	4
Law	1,177	0	0
Kirby & Hickery (accepted)	1,060	0	0

For building a pair of semi-detached houses, Harrow-road West, Dorking, exclusive of ironmongery and plumbing, for Mr. P. L. Saubergne. Mr. F. J. Dibble, architect:—

Goddard & Sons	£1,690	0	0
Lynn & Dudley	1,480	0	0
Hamblin Bros.	1,345	0	0

For erecting new villa residence at Olton, near Birmingham, for Mr. W. Johnson. Messrs. Harnor & Waters, architects:—

Denner, Acocks-green, accepted.

For pulling down and rebuilding the front, and sundry alterations and repairs to No. 36, Elizabeth-street, Pimlico, for Mr. George Harnor. Messrs. Harnor & Waters, architects:—

Coulthard, accepted.

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W. C. B.—A. H.—C. H. G.—J. H.—W. W.—E. M.—P. B.—D. K. & Son.—B. & A.—A. M.—C. R. W.—J. P. O.—F. J. D.—H. B. M.—R. W. W. J.—D. W.—P. & Son—C. G.—H. B. & Co.—P. S.—G. K. F. P.—J. H.—I. F. & Co.—D. R. D.—T. W. P. I—F. N. P. (there is no difficulty in imagining the dog-trough on the other side).—B. P. (shall have consideration).—W. T. N.

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